SETTING PLACE AT THE TABLE:
THE CULTURAL BIOGEOGRAPHY OF MOLE

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David Strauch

Thesis Committee:
Lyndon Wester, Chairperson
Mary McDonald
Matt McGranaghan

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Abstract

The celebration of *mole* as the national dish of Mexico draws explicitly on the biogeography of its ingredients, often read as a proxy for the cultural origins of the national character. *Mole* is represented as coextensive with the Republic, complex, and a synthesis of New World and Old World elements. This thesis assesses these claims with attention to the spatial and taxonomic scales at which they are made, and discusses the implications of scale in narratives of place. A combination of quantitative and qualitative methodologies draws on the dual traditions that (in)form cultural biogeography, and reveals connections between levels of generalization and narrative implication. Determining the biogeographical value of ingredients is found to be complicated by ambiguous taxa, culinary plant complexes, and varied ways of counting. The predominant discourse of *mole* is found to rely on ahistorical biogeographical essentialism, which supports dichotomous constructions of nationalism, while greater attention to the particular cultural biogeographies of the foodplants, at finer scales, undermines Eurocentric narratives and recognizes the agency of multiple indigenous cultures in transdomesticating plants across varied neotropical ecosystems. Ultimately, *mole* can be considered representative of Mexico not so much for a single determined identity as for the complexity of its diverse and ongoing interpretations.

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Acknowledgements

Mole is famously the product of many hands, and the complexity of its flavoring comes as much from the process as the ingredients.

My first thanks must go to Edelmira Linares of the Jardín Botanico at the Universidad Nacional Autónoma de México (UNAM), who, in a 2007 visit to Hawai'i with Bob Bye, presented a talk on the "Ethnobotany of Mole," which planted the seed for this thesis. When I subsequently visited Mexico, Edelmira and Bob suggested, and introduced me to, an array of people with expertise in *mole* and Mexican cuisine. Many of the people I talked with are listed in Appendix A, and I am grateful to all of them for the time and knowledge they shared with me. One of the great advantages to studying food in Mexico, besides the plethora of fantastic food itself, is that everywhere people delight in discussing it, and my understanding has been immeasurably deepened by conversations with vendors and commensal eaters, most of whom must remain anonymous, but nevertheless warmly thanked. I certainly extend this to the makers of many *moles* I've eaten over the years, starting with the wonderful *mole colorado* at La Choza in Los Angeles thirty-five years ago.

Edelmira and Bob had an earlier influence as well, because when I had begun to be interested in the ethnobotany of Mexican plants fifteen years before their visit, their papers on markets, and their Field Guide for the AAG meeting in Mexico, were among the most useful introductions to a host of new plants and landscapes. At the time I was at the apogee of my orbit away from academia, ten years out of school, and their work gave me the first hint that I might have a reason to return. Ten years later, living in Hawai'i, I decided to take a couple classes to see if it suited me, and one of these was Lyndon Wester's class in cultural biogeography, which settled the question.

I am grateful to Lyndon for introducing me to this field and for remaining my advisor even into his retirement. My other committee members, Matt McGranaghan and Mary McDonald. have also been particularly helpful, both in terms of practical considerations and in more wide-ranging discussions, and I have also been fortunate to have been introduced to new ways of thinking by a number of excellent teachers — Krisna Suryanata, Ev Wingert, and Mark Merlin in Geography, Terry Hunt and Nina Etkin in Anthropology, and Mike Forman in Linguistics — whose influence I can feel in the following pages, even where it isn't explicit enough to cite.

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I. Introduction

Food has long been one of the things which people associate most intimately with places. Local festivals feature specialties which embody cultural traditions or endemic produce. Emigrants and expatriates wax nostalgic about foods of the homeland, and recreate them in overseas communities as best they can, often taking pains to import prized key ingredients. Travelers report the exotic tastes and habits of lands they visit, and seek out famous regional dishes and unfamiliar fruits and flavors. Stories of place-based foods form a large part of the popular culinary literature comprised of cookbooks, restaurant reviews, food columns in periodicals and travel magazines, and the expanding genre of food biographies. Certain iconic foods, and "national dishes" in particular, are celebrated as manifesting values or qualities associated with regional or national character.

Celebrations of regional foods often highlight the qualities of particular local ingredients, which is to say, the character of other species and the long histories of human engagement with them. Cultural biogeography underlies the salience of regional foods, and is explicitly referenced in some food discourses. An outstanding example of this is the Mexican feast dish *mole*, frequently referred to as the "national dish" of Mexico. Descriptions of *mole* draw on the geographical origins of the ingredients as a proxy for discussing the origins of the national culture. The predominant discourse argues that the synthesis of Old World and New World ingredients make *mole* emblematic of *mestizo* culture (e.g. Taibo 1981), while others identify the dish as predominantly Old World (e.g. Laudan and Pilcher 1999) or indigenous (e.g. Buenrostro and Barros 2003). While the discursive construction of this debate is itself interesting, it is also worth investigating some of the empirical claims upon which it rests. These are: 1) that *mole* is a national dish, i.e. found throughout the nation; 2) that *mole* is generally a "complex" dish, signified by a high number of ingredients; and 3) that *mole* ingredients show a clear and generally even division of biogeographical origins.

The discourse of *mole* relies on categories (e.g. "Mexico," "indigenous," "chile," "mole") which are taken as given without explicit consideration, in the scholarly as well as the popular literature. Yet Brubaker (2004) has alerted us to the dangers of taking "categories of practice" for "categories of analysis." This suggests that it would be worth reexamining the discourse of *mole* with a more critical eye towards the categories employed, and seeing whether the discursive claims hold up at different scales of analysis.

1.1 Geographies of food

Geographers have taken a variety of approaches in studying food and its relation to culture. Key foods have been analyzed in studies of cultural organization and political economy. A pioneering work in this regard was Mintz' (1985) *Sweetness and power*, in which the construction of sugar's place in European foodways is linked to the global restructuring of an industrial, colonial economy. Marcus (1995:107) sees this strategy of "following the thing" as a kind of "multi-sited ethnography" which undermines the distancing of the subject created by traditional scholarship. A current proponent of "following the thing," especially in terms of food, is English geographer Ian Cook, who has followed papayas (Cook *et al.* 2004), pepper sauce (Cook and Harrison 2007), and foods in general (Cook *et al.* 2006), although Goss (2006:240) argues that this work tends to refetishize these foods as academic objects. Some studies read individual foods as symbols of local identity (Davis and Morgan 2005, Haverluk 2002, Monrreal 2008) or as markers of globalization (Bestor 2000, Roseberry 1996), while others inquire into food systems (Freidberg 2003, Goodman and Redclift 1991), including recent "alternative" agricultures (Fish *et al.* 2006, Guthman 2004), and food practices like cookbooks, restaurants and culinary tourism (Dillon *et al.* 2007, Duruz 2004, Gibson 2007, Heldke 2001, Molz 2007, Zelinsky 1985). There are now as well a number of general papers and thematic surveys which discuss food studies and the geography of food itself (Bell 2002, Feagan 2007, Mathewson 2000, Shanahan 2002, Shortridge and Shortridge 1995).

Food studies in cultural and economic geography tend to be interested in contemporary problems. Cultural biogeography offers a longer perspective, looking at the relationships between humans and the species we interact with over the course of millennia, particularly in the last 10,000 years of agricultural development. Studies of subsistence strategies and domestication of cultivars (Anderson 1997, Denevan 1980, Deur 2002) have demonstrated useful ways of looking at the human environment and organization of landscapes, leading into studies of food in colonial regimes (Alvarez 2007, Carney 2001, De Vos 2006, Fadiman 2005). Although cultural biogeography appears in some survey texts (e.g. Gaile and Willmott 2006) as a sub-sub-discipline, it is rooted in a less subdivided approach to geography, and integrates cultural and ecological approaches. The longstanding geographical concern with the relationship between humans and their environment was reframed by Carl Sauer and his colleagues in the "Berkeley School" of geography as a problem of "cultural landscapes" in which systems of food production were a keystone element. Sauer and many of his students worked in Mexico and other parts of Latin America, and his academic lineage includes an explicitly biological component; his son, Jonathan D. (J. D.) Sauer, took a doctorate in botany but returned to geography at UCLA, where he taught a generation of cultural biogeographers (Brothers *et al.* 2009). While Carl Sauer's earlier cultural ecology work favored theories of dispersed knowledge, his heirs' later work on agricultural origins tends to support independent innovation and multiple domestication, even in the same region, "reflect[ing] four decades of

new data, a scientific approach over Goethean humanism, the consistent application of a Darwinian line of thought, and perhaps also a dash of oedipal iconoclasm" (Gade 1994:492).

Cultural biogeography is now somewhat invisible because its central concerns have been taken on by other fields. As Terrel (2006:2088) notes:

> Focusing on human biogeography as a research endeavour may make sense to biogeographers, but in the academic world generally this particular scholarly niche has long been filled by other rival disciplines such as sociology, human ecology, geography, anthropology and archaeology.

Like cultural biogeography, the expanding field of "food studies" is multidisciplinary, and the literature on place-identified food is abundant and varied. Not only is there a wide spectrum ranging from popular writing to academic studies, but many authors' positions on this spectrum are fluid. Professional scholars often write in mainstream periodicals, online blogs, or other informal venues, while cooks and gastronomes sometimes publish rigorously documented work. Particularly in Mexico, food studies support and rely on, to a greater degree than many academic fields, an older tradition of scholarship in which "free-floating intellectuals"[1] occupy a range of public positions which include but are not limited to the academy.

As food studies itself has become increasingly established within the academy (Nestle and McIntosh 2010:160), the erstwhile culinary vocational schools are becoming more academically productive as well. In Mexico this trend is manifested in the increasing contributions to scholarly discourse from several programs in gastronomy and tourism, which are now making available, through ScholarSpace or other online repositories, the theses students write (sometimes collaboratively) as part of their degree qualifications (e.g. Aguero Carranza 2007, Barrueto Mejia *et al.* 2010, Benitez Esquivel *et al.* 2010, Coronel Flores 2010, López Bello 2008). Additionally, conferences publish papers from a spectrum of contributors. The diversity of food scholarship in Mexico is well illustrated by the roster of presenters at a conference on *mole* held in Puebla in 2004 (Iturriaga 2004), which included columnists from one of Mexico' s leading newspapers[2], a teacher from a culinary institute[3], botanists from the botanic garden at UNAM[4], a historian from a social anthropology institute[5], an editor at the National Commission for Culture and the Arts[6], and a restaurateur and food consultant[7]. The most celebrated speaker

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[1] Schegloff's (1997:169) translation of Mannheim's *freischwebende Intelligenz*; see Ellis and Fopp 2007 for other translations and discussion.

[2] Cristina Barros and Marco Buenrostro, whose "Itacate" column on Mexican foodways appears Tuesdays in the culture section of the newspaper *La Jornada*; they have also contributed to other projects and written a number of books on food and culture (e.g. Barros 2011, Barros and Buenrostro 2002).

[3] José Luis Curiel Monteagudo, who teaches at the University of the Claustro de Sor Juana.

[4] Edelmira Linares and Robert Bye.

[5] Ricardo Pérez Monfort.

[6] José N. Iturriaga, who has at CONACULTA overseen projects such as the incredible "Indigenous and Popular Cooking" series. See note 17.

at this conference was the writer Paco Ignacio Taibo I, an expatriate Spanish gastronome and independent critic, essayist and novelist, whose *Book of all moles* (Taibo 2003) had just been published. This book reworks and fleshes out his lovely *Breviario del mole poblano* (Taibo 1981), a short celebratory look at the cultural ebullience that surrounds the classic high form of the dish, which, if not the last scholarly word in *mole*, might possibly be the first one, as it was the earliest comprehensive investigation of the subject. It was also one of the first popular monographs devoted to a single foodstuff, which today are enjoying such a vogue in the Anglophone world[8].

Shortly after the Puebla conference, two cookbooks devoted to *mole* were published, and their titles form an interesting pair. The first, written by renowned artist Marta Chapa, is called *The republic of mole* (Chapa 2005), emphasizing its identification with the modern nation (see Chapter 3). The second, written by one of Mexico's leading chefs, Patricia Quintana, is called *Mulli* (Quintana 2006), emphasizing its continuity with prehispanic traditions by identifying the dish by its Nahuatl name. Both books provide discussions of *mole* as well as recipes. *Mole* is also extensively treated in Ricardo Muñoz Zurita's (2012) dictionary (discussed in Chapter 5).

Quintana and Muñoz Zurita are prime exemplars of the "scholar-cook," a phrase apparently originating in Barr and Levy's (1984:31) *Official Foodie Handbook*. The designation is an informal one, and not all authors so described are as rigorous. Heldke (2001:185) points out that even though Claudia Roden (one of Barr and Levy's exemplars) was praised for acknowledging sources, she does so less reliably for oral sources than for written ones. Following Pratt (1992), Heldke argues that such appropriation still mirrors a colonial relationship, even if it is done with "veneration and admiration" (Heldke 2001:184). However, it may be that, perhaps partly in response to this kind of criticism, standards for scholar-cooks are emerging, since more recent work seems to include better attribution.

Tom Jaine (2003) provides an explanation for the work of scholar-cooks in his *Guardian* obituary for Elisabeth Lambert-Ortíz:

> She was of that group called "the scholar cooks" when foodies were discovered by Harpers & Queen [publishers of Barr and Levy in 1984], for she seemed as enthusiastic for researching the creation-myth of a dish, for instance the mole poblano of Mexico, as she was for the cooking of it. … Understanding the cookery of Latin America required appreciation of its history. The collision of civilisations that occurred after the Spanish conquest, and the adoption by the colonisers of so many new raw materials such as the whole chilli and pepper tribe, the tomato, the potato, chocolate, French beans and avocados, down to the very staple, maize, meant that Latin American cookery was a hybrid of infinite gradations that needed a scholar to explain it, before even a pan had been warmed.

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[7] Lula Bertrán is a renowned chef from Mexico City, whose eponymous restaurant in Santa Monica, California was one of the first in the US to present Mexican food as haute cuisine.

[8] For instance, in August 2011, Andrew F. Smith announced four new books in Reaktion Press's "Edible Series," bringing the total number to 24. They range from *Apple: A global history* to *Whiskey: A global history*, with another 36 under contract and proposals solicited for another dozen.

The pre-eminent English-language scholar-cook of Mexican cuisine is Diana Kennedy, who from the 1970s onward has explained Mexican cuisine to Anglophone audiences, and who now lives in Mexico and publishes and teaches there as well. Her earlier books (1972, 1978) introduced the regional variability of the cuisine to new audiences, while translating recipes for their kitchens; as her audience's sophistication has grown, her writing (1998, 2003, 2010) has become more ethnographic, championing ecological and cultural conservation.

While scholar-cooks are interested in understanding a dish in order to better recreate it, *mole* has also received the scholarly attention of some non-cooks (or at least of those who do not reference their cooking in their work). Jeffrey Pilcher has written extensively on Mexican food history, beginning with his classic (1998) study of the use of cuisine in constructing national identity, although he gives less attention to *mole* than to *tamales*. Joy Adapon (2008) provides a good introduction to the social context of *mole* consumption.

1.2 Speaking of mole

Just as geographical categories are often taken for granted, so too are the identities of food dishes themselves. When people speak of a dish, they refer not to one particular serving of food, but to thousands of meals that are treated as essentially the same thing. This common-sense act of categorization is rarely explicit, and the level of generalization can vary widely between different dishes, presenting some taxonomic problems worth further investigation, particularly because they may parallel and illuminate the kinds of spatial generalizations that are employed in reifying places.

This makes discussing iconic dishes a little more challenging at the outset. A reader could well expect a thesis like this one to begin with a definition of the subject, an imperative reinforced when writing about *mole* in English, because the food needs to be distinguished from other possible interpretations of the word. *Mole* is not a sauce served with a small subterranean mammal, nor a dark mark on the face. Other food terms derived from the Nahuatl language, like *tamales* or *chilaquiles* — both of which also refer to highly variable spectra of dishes — don't present this problem, or pressure to propose an immediate definition. The ambiguous character of the word in English leads most discussions of *mole* to rush to a fairly limited definition of the word — usually something like "a thickened sauce of chiles[9] and chocolate" — which fails to represent the variety of the dish found in Mexico.

This is not a problem only in English; even in Spanish, definitions of *mole* are divergent, and underlie many of the debates about what *mole* means as a national symbol. This is partly a question of whether the word carries the full meaning from the language of its derivation (i.e.

[9] In this paper I use the spelling "chile" for the fruit of *Capsicum annuum*, consistent with the Spanish usage, and now commonly used in English language food literature on Mexican cuisine; the variant spelling "chilli" may be more common in literature on Asian cuisines.

Nahuatl for Spanish[10], and Spanish for English) or whether it denotes the more restricted meaning of the new language, and partly a question of what languages are considered valid within the national discourse[11]. So rather than begin this paper by defining *mole* as a category of analysis, I will treat the term as another category of practice, and examine how that category is constructed.

1.3 Getting a taste of mole

My thesis questions sprang from exposure to mole and food experts across Mexico. In fall of 2007, I went to Mexico to film a presentation on *mole*, to be delivered by ethnobotanist Edelmira Linares. Linares had earlier that year visited Hawai'i and given a lecture on the same topic, organized by the Botany Department of the University of Hawai'i, for whom I had been working at the time, editing video lectures for an introductory ethnobotany class. I had talked with the coordinator of the project, Will McClatchey, about the possibility of fleshing out the films with more background material, and he suggested that Linares' presentation on *mole* would be an exemplary place to start. I learned there was a National Mole Festival in the fall, and planned my trip to spend time there, hoping to talk to *mole* producers and aficionados from all over the country.

In Mexico, however, I found that things were not as I had expected them to be. For one thing, the National Mole Festival turned out not to be an assemblage of cooks from across the country, but a local celebration by a town that promotes itself as the national center of *mole*

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[10] Although the derivation from *molli*, the Nahuatl word for sauce, is pretty clear, its adoption into Spanish may have been reinforced by its resonance with the Spanish verb *moler*, to grind (Laudan 2004), and even its meaning in modern English and Nahuatl may be shifting as those speech communities change (Hill and Hill 1986).

[11] The problem of knowing which language a word belongs to, in multilingual contexts, is well illustrated by the words *tamal/tamale*, with the latter generally treated as an English word. Over eighty years ago, Redfield (1929:177) noted that "the 'hot tamale' of Mexico has become a commonplace in North American cities today." Like many subsequent writers, she italicized "*tamal*" but not "tamale," with some authors using this as a contrast between a Spanish usage and its English meaning. Ayora Diaz (2010:415) describes "*tamal de novia*" as "a wedding tamale" and Taube (1989:45) glosses "*tamal de elote*" as "tamale prepared from fresh, green maize." Bonta et al. (2006:239) translate "*Tamal de tiusinte*" as "Tiusinte tamale" and Wilson (1911:137) interprets " 'Tio Tamal' " as " 'Uncle Tamale' " (without italics but within quote-marks). Bayless (2009) generally uses "*tamal*" but in one instance "tamale" when referring to the food of Oklahoma City. Long (2001) italicizes "*tamale*" in writing of midwestern foodways, but in general scholars use "tamale" without italicization (e.g. Cleveland and Soleri 2007, Cravey 2010, Dean et al. 2011, Dillon et al. 2007, Gabaccia and Pilcher 2011, Monrreal 2008, Nenes 2008, O'Neil 2006, Soleri and Cleveland 2008, Staller and Carrasco 2010).

Yet curiously, the English form of this word is closer to the original Nahuatl word. This is probably accidental, since it appears that the English singular form derives from the plural, "tamales" (the word used in both languages and probably the original loan-word from Spanish to English), but Watson's (1938:117) observation that "the name of this dish is the *tamal* or *tamale* (or earlier *tamauli*), a word in American currency from 1836 and descending from Nahuatl *tamalli*" suggests that an earlier form may have had some influence. In Nahuatl, nouns are formed with suffixes according to their roots, with roots ending with an "l" using the suffix "-li," e.g. *tamalli*, *chilli*, and *molli*.

production. The diversity of *mole* at the festival turned out to be the local interpretation of a dozen or so iconic *moles*. Another difficulty was Linares' busy schedule that fall; while she wasn't immediately able to film the presentation, she suggested that there were several people I could talk with in the meantime[12], who would have interesting things to say about *mole*. This was something of an understatement.

I went to Mexico with a pretty good understanding of what *mole* is, and left four months later without one. I had eaten dozens of *moles* and had scores of conversations about *mole*, and it was difficult to determine what was common to them all, or to explain just what defines a *mole*. As I tried to figure out how *mole* could be at the same time so iconic and yet so various, I came to realize how much the question was a geographic one, not only because many *moles* are closely associated with places, at a variety of scales (see Table 3.3), but also because their importance is explained in explicitly geographical — and particularly biogeographical — terms.

1.4 Research questions

As part of a broader interest in how other species interact with human cultures in the formation of place, I would like to ask how the plants used in a celebrated national dish contribute to constructions of place identity at national and regional scales. It is not my intention to produce a definitive mapping of the ingredients, or to determine the correct interpretation of their role in the dish, but rather to explore how they have been mapped and interpreted in the process of constituting a symbolic dish. That is, I am interested in what people make of the plants. This is similar to the way in which ethnomethodologists locate meaning not in an actor's or speaker's intentions, but in observers' reactions to them (Bailyn 2002:316-317). Actions and utterances are understood to have a multiplicity of meaningful possibilities, from which observers "make accountable" only certain ones. Similarly, plants have wide arrays of characteristics which might make them salient to people as national symbols. It is notable in the discourse of *mole* that their geographical origins are particularly important, or accountable, and I hope to better understand how those biogeographical accounts have been culturally constructed.

I will begin in Chapter 2 by revisiting a proposition from historian Jeffrey Pilcher's studies of food in the construction of Mexican nationalism. Having written at greater length about tamales and tacos, Pilcher (1996:193) asserts that "the most common culinary metaphor for the Mexican nation was *mole poblano*" because the combination of "seasonings from the Old World with chile peppers from the New … represented Mexico's 'cosmic race'" i.e. the "national identity, a *mestizo* blend of Native American and Spanish influences." Pilcher's work demonstrates the role of food in this particular construction of nationalism, but does not explore

[12] Interviews are listed in Appendix A, but not quoted in this thesis.

subnational scales of identity and how they might be constructed in complementary or contrasting ways. Similarly, the constituents of *mole* are analyzed only at a hemispheric scale, allowing only a very generalized idea of the biogeographical synthesis that the dish represents.

I will then see whether this assertion holds up at finer scales of analysis, by examining the various ways *mole* is employed in discourses of place, the variety of its preparations, and the origins of its ingredients at bioregional scales. Explicating and evaluating these claims can be framed as the following four questions:

1) What is the discourse about the identity of mole and nation? In Chapter 2, I will describe the ways in which *mole* is characterized in the discourse, and articulate the claims made concerning it.
2) To what extent is *mole* a "national dish"? Is it found in all parts of Mexico? I seek ways to answer this question in Chapter 3.
3) Is the "complexity" of *mole*, often identified with its many ingredients, supported by an examination of *mole* recipes? And how else might complexity be understood? I seek answers through ingredients in Chapter 4 and culinary plant complexes in Chapter 5.
4) How are the biogeographical origins of *mole* ingredients made accountable in the discourse? Does *mole* really represent a synthesis of Old and New Worlds? How should ingredients best be weighted to evaluate this? Chapter 5 evaluates ways of enumerating and weighing ingredients, and plant origins and domestications are the topics of Chapter 6.

In evaluating these claims, I will pay particular attention to the categories and scales usually employed, and explore whether the validity of the claims would change at other scales. In the conclusion I will reflect on how multiscalar analysis affects Pilcher's mestizo thesis, and the symbolic utility of a national dish.

1.5 Mixed methods

I intend to address these questions through a review of the extensive literature, popular as well as scholarly, already published on *mole*, and an analysis of published recipes. I will begin by introducing *mole* and its importance in the culinary discourse of Mexico, with particular attention to the ways in which its geographical aspects — origin of ingredients, regional styles of preparation — are made accountable in the discourse. Looking at the claims that are made concerning it, I will see whether these accurately reflect the distribution of *mole*, and the characteristics of about three hundred *mole* recipes. This corpus is a non-random sampling of recipes, and I will discuss why this is so and how this constrains statistical analysis, and why it should still be possible to characterize some of the variation between recipes according to type, origin, and source. Having explored the variability of the dish, I will discuss some alternative ways of assessing its biogeographical composition, and explore how the scale of analysis chosen has implications for understanding the role of the dish.

For an initial assessment of the claims made in the *mole* discourse, I will analyze several sets of data I have assembled:

Mole_by_State describes the 32 states of the Mexican republic, and the number of Spanish-language websites reported by Google searches of each state name with "*mole*." Details of and problems with this sampling strategy will be discussed. This set builds on a georeferenced database file, allowing the data to be manipulated by GIS software for visualizing results. This set helps me evaluate whether internet presence of the word *mole* suggest spatial patterning (Chapter 3).

Mole_Recipes describes 360 recipes drawn from published sources, listing the source and page number of each recipe, the region and culture to which it belongs, and the number of ingredients which it contains. Where determinable, recipes have been classed into types at two hierarchical levels. These data will be used to assess whether complexity is normally distributed across *mole* recipes, and examined for additional patterning (Chapter 4).

Mole_Salience gives the frequency of ingredients listed in an encyclopedic table of *moles* in one of the most extensive scholarly surveys (Muñoz Zurita 2012). These data help to evaluate the relative importance of *mole* ingredients, and whether Old World and New World ingredients should be given equal weight (Chapter 5).

In each chapter, I will also discuss the results of the quantitative analysis, and how they reflect the assumptions which underlie the analysis. Particularly, I will consider how changing the scale at which the questions are asked might affect the results, and how the way the results are articulated carries a scalar bias which has consequences for the discourse. After the three chapters with quantitative analysis, I will extend this interpretative approach in Chapter 6 to another aspect of biogeographic scale by considering how the case histories of three Mesoamerican plants might illuminate the cultural histories in which they are embedded.

Addressing my research questions with mixed methodology draws on both disciplinary streams whose confluence produces cultural biogeography. As a part of physical geography, evolutionary biogeography generally relies on quantitative analysis, including geospatial statistical analysis, while cultural geography is usually more hermeneutic, and grounded in qualitative analysis and critical theory. I hope to show that these frameworks are complementary. I expect that quantitative analysis can reveal the areas of the discourse which are problematic, and that qualitative interpretation can then suggest ways in which the assumptions built into the discourse, especially in terms of scale, produce results which could vary were other assumptions made. Because "national dishes" are treated as proxies for national identities, the implications of this analysis can suggest avenues of investigation for political and cultural geographers as well as for cultural biogeographers.

II. The spatial salience of *mole*

2.1 Dishing up the nation

> …Consuelo served the *mole*, and when Doroteo had tasted it, he roared like a lion.
>
> "Truly, woman, you have learned the secret of the *mole* of Petra. How is this possible?"
>
> "You follow a recipe that my mother's mother wrote down on a bit of card," Petra said, unimpressed. "Instead of throwing everything into the pot at haphazard like most women do."
>
> "Is it good?" Consuelo asked.
>
> "A man could go to his death happily having tasted this *mole*, *hermanita*. I have become your slave."
>
> It was one of the few matters that Doroteo could not exaggerate beyond the limits of credibility. For to taste a well prepared *mole* sauce was an experience more exquisite than most of what one knows in this life. It is a taste that makes one think the very sun that nourished the herbs glowed in one's mouth and throat and then spread throughout the body, causing at once a strengthening of the spirit and a sharpening of the senses. The freshness of pure water, the richness of the earth from which all life arises, blossomed in the sauce.
>
> — Laurence Gonzales (1983) *El Vago*.

In Mexico it seems that people love talking about food almost as much as eating it, especially about the "typical" foods associated with particular places. Dishes may be identified with regions, states, towns, or even small villages. There are only a few foods which are considered to be national dishes, and probably the chief among these is *mole*.

Although citizens of some nationalities might be hard pressed to explain why certain foods — say, hamburgers or apple pie — are considered national dishes, this is rarely a problem encountered in Mexico. *Mole* is often represented as an allegory of the national character, drawing explicitly on the biogeography of the ingredients, which are understood to come from both hemispheres. The dish exemplifies a synthesis of the indigenous new-world cultures with the colonizing culture of old-world Spaniards, and serves as a proxy for the mestizo national identity.

The mestizo national character exemplified by *mole* evokes strong feelings in citizens. At the Sixth Conference on Gastronomic Patrimony and Cultural Tourism, which was devoted to *mole*, Benito Taibo (2004:119) expressed the embodied nature of this identity:

> I believe *mole* to be the culmination of the synthesis of the two cultures, themselves deriving from others still, which give me daily breath because they are in my soul and in my blood.[13]

[13] "*Creo en el mole como la culminación del sincretismo que fundió dos culturas, provientes ellas de otras más y que me hacen suspirar todos los días porque están en mi alma y mi sangre.*" Translations in this paper are my own, with the original texts in footnotes. Benito Taibo is the son of Spanish immigrants, so this construction is interesting, as it implies that his blood acquired an indigenous character through non-genetic means.

Half a century earlier, Alfonso Reyes (1953) was even more emphatic about the political implications of the dish:

> Turkey *mole* is the *pièce de resistance* of our cuisine, the touchstone of cooking and eating, and to ignore *mole* could almost be considered an act of treason against the nation.[14]

This feast dish, then, is more than just a food. It is a resource for constructing identity, both of the nation and its citizens. As such, it has produced over the decades not only countless ephemeral meals, which are not accessible to researchers, but also a wealth of discourse, which is accessible, and which will form the subject of this paper.

2.2 Feeding the cosmic race

The understanding of a mestizo identity is historically specific, articulated after the Mexican Revolution (1910–1920[15]), which overthrew a neocolonialist regime that had largely oriented Mexico's economy towards foreign investment and its culture towards Europe.[16] The revolutionary impulse to include *los de abajo*, the largely indigenous and mestizo underclasses, in the national life was expressed in a postrevolutionary intellectual and artistic renaissance supported by the new government which began the eighty year rule of the Party of the Institutionalized Revolution (PRI). The national multiethnic identity of Mexico was characterized as "the cosmic race" by Secretary of Education José Vasconcelos (1997 [1925]).

Pilcher (1998) examines the way foodways were employed both before and after the revolution as proxies for cultural identity. His goal is explicit: "to interpret the Mexican national identity — as embodied by the mestizo, the mixed-race offspring of the Native American and Spanish parents — through the history of Mexico's cuisines." He explores the relative positioning of corn and wheat in hegemonic colonial discourses, contrasted with the postrevolutionary valorization of dishes which incorporate indigenous elements. The quintessence of the culinary synthesis is *mole poblano*.

The mestizo character of *mole* is often explained by an origin myth, or just-so story, that locates its invention in a convent of the colonial period:

> This edible intermingling of cultures took place throughout the land, and perhaps most dynamically in Spanish convents and missions, which, by offering bed and board to travelers, also became early restaurants of a sort. Mexico's national dish, *mole poblano de guajolote*, was even developed, so the story goes, as a piece of divinely inspired culinary serendipity by 16th

[14] "*El mole de guajolote es la pieza de resistencia en nuestra cocina, la piedra de toque del guisar y el comer, y negarse al mole casi puede considerarse como una traición a la patria.*"

[15] These are the dates generally given for the civil conflict that reshaped Mexico's governmental structures, killing an eighth of the population in the process, but some intellectuals suggest a longer framework of revolution which includes earlier and/or subsequent social processes (see e.g. Gonzales 2002).

[16] Although this regime, called the Porfiriato after President Porfirio Díaz, predates the term *neocolonialism*, it fits that term well.

> century nuns scurrying to put together a dinner worthy of a visiting archbishop. They cooked wild turkey in a smooth, rich sauce that combined indigenous chilies, tomatoes, cornmeal and chocolate with such newcomers as onions, garlic, almonds and grapes to make a whole far greater than the sum of its many parts. (Feniger and Milliken 1996:8)

This story and its variants seem to have originated in the twentieth century, but while generally considered apocryphal, they are nonetheless celebrated and often repeated. Drawing on Anderson's (2006 [1983]) point that nationalist movements seek legitimacy by locating antecedents in the past, Pilcher (1998:43) argues that "the twentieth century authors who glorified colonial *moles* as 'mestizo' cuisine displayed the nationalist ideology of modern Mexico rather than the hierarchical mentality of the colonial period."

Yet there is also a danger in generalizing and reifying "colonial mentality," and assuming that an appreciation of hierarchy was pervasive throughout the colonial populace. The written historical record, which reflects the concern with hierarchy, was largely produced by a restricted elite, while large segments of the population, for whom "society" was unavailable, may have enjoyed various elements of mestizo culture, without, of course, conceiving of it as a nationalist project. Anderson (2006 [1983]) locates the beginning of the imagination of nations in the Americas well before the twentieth century, in the independence movements beginning in the late eighteenth century, and even these appear via the writing of Creole elites organizing the independence struggles. These presumably drew for their armies on a spectrum of men already prepared to recognize their interests in such causes. While nationalism may be a more recent phenomenon, the resources on which it draws to construct history are not necessarily invented, but may include practices which were simply illegible to prior regimes of elite discourse.

III. Placing *mole*

3.1 The republic of moles

As a "national dish," *mole* is conceived as being distributed throughout the territory of the contemporary republic. José N. Iturriaga de la Fuente (2004:10), a scholar who has been particularly attentive to the spatial distribution of foods,[17] writes, as the convener of the 2004 conference on *mole*:

> The geography of *mole* covers a good deal of the parts of the country; the history and contemporaneity of *mole*, in sum, can be seen as a factor that unites various regions of Mexico.[18]

In their paper for the same conference, Linares and Bye (2004:64) observe that *mole* is much prepared throughout the whole country.[19] This premise underlies Martha Chapa's (2005) book, *The Republic of Moles*, which provides up to half a dozen recipes from each state. These writings create the impression that *mole* is found equally in all parts of Mexico.

To test whether *mole* evenly permeates the nation, I wanted to map the distribution of the dish in some way. Ideally this would reflect an even survey of dishes across Mexico, analogous to the mapping of species distributions through voucher specimens — but no such culinary survey has ever been made. Cookbooks and other food literature provide anecdotal accounts but are often organized by regional interests and so could hardly form an unbiased dataset. Counting recipes from cookbooks or other collections would incorporate their particular geographical biases, which usually focus on a particular region, which would skew the count in that direction, but occasionally, as in Chapa's case, pick a few recipes from each state, which would have a leveling effect.

An initial way to examine the distribution of *mole* is to generalize it to the state level, and look for whether it is discussed in relation to every state, and whether there was a significant difference between central and peripheral states. To quantify the virtual association of *mole* with each state, I performed a Google search for *mole* and each state name, excluding sites that included five state names (in order to avoid counting sites with a national focus), and filtered for on Spanish language websites only. Because results numbered in the thousands, I did not

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[17] In addition to being the series editor for a set of over fifty cookbooks on indigenous and popular cooking from different parts of the country, produced by Mexico's National Council for Culture and Arts (CONACULTA; Iturriaga 1999–2001), Iturriaga wrote a series of articles on the "geography and radiography" of tacos (1978) and tamales (1981), later collected and published as a book (1987, 1993) with additional discussion of tortas, a class of sandwiches made on bolillos (rather like French bread), unusual in being classed as antojitos while based on wheat rather than corn.

[18] *"La geografía del mole incluye a buena parte de las entidades del país; la historia y el presente del mole, en suma, se vieron como un factor que unifica a todas las regiones de México."*

[19] *"El mole es un platillo muy empleado en todo el país"*

screen for the context of association —so the actual page content may say no mole exists in a given state, yet this would be counted as a positive association for that state. There are still several problems with this approach, which may incorporate different kinds of bias. First, some states may have inflated results because the state name refers to somewhere or something else as well. For example, *Yucatán* refers both to the state and to the wider region which also includes the states of Campeche and Quintana Roo. In addition to being the name of a state, *Sonora* is the name of one of the largest markets in Mexico City, where *mole* pastes and ingredients are sold, among other things, and is a common word besides (for instance, *banda sonora* means soundtrack). Inflated associations may also come from states with higher internet development and representation due to tourist areas such as Acapulco (Guerrero) and Cancun (Quintana Roo, and again Yucatán for the wider region). Results may also reflect the generally higher populations of central states, although the 10 most populous states include four peripheral ones (Jalisco, Chiapas, Nuevo León and Chihuahua) while some central states with high mole associations have relatively low populations (e.g. Querétaro). Higher economic development may correlate to more websites and hence search results, but this is difficult to spatially characterize. Overall, I did not see any way to add additional filters to the search that wouldn't potentially bias it in other ways.

To test for whether *moles* have a statistically higher association with central states than throughout Mexico as a whole, I added the resulting numbers to the database associated with a shapefile of Mexican states, downloaded from the US National Atlas[20] (adjusting the state names and abbreviations in this file to conform with common usage and contemporary orthography), to see whether results were similar for central and peripheral states.

Distribution of *mole* in Mexico

Mole is virtually associated with every state in the Mexican republic. Table 3.1 shows the data assembled to test when *moles* have a statistically higher association with central states than throughout Mexico as a whole. The data set is comprised of thirty-two records in four fields. Central states were selected by drawing a circle with a radius of 200 miles around Mexico City, the ancient, historical and contemporary center of population and power. (Figure 3.1; any circle with a radius of between 120 and 220 miles — 200 and 350 kilometers — would select the same set of states). An alternative approach of counting three states out from the capital would have returned nearly the same group, with the addition of Jalisco and Colima.

The sections below ask how a geospatial analysis of the virtual mole helps us to visualize spatial distributions across the states of Mexico.

[20] <http://www.nationalatlas.gov/atlasftp.html>

Table 3.1. Mexican states with number of associated Spanish-language websites concerning *mole*.

STATENAME	STATEABB	MOLES	CENTRALITY
Oaxaca	OAX	167000	central
Querétaro	QUE	132000	central
Puebla	PUE	114000	central
Guerrero	GRO	106000	central
Veracruz	VER	88400	central
Hidalgo	HID	85000	central
Guanajuato	GUA	79000	central
Sonora	SON	76200	peripheral
Jalisco	JAL	74000	peripheral
Yucatán	YUC	65700	peripheral
Chihuahua	CHH	65100	peripheral
Distrito Federal	DF	64300	central
Michoacán	MIC	64000	central
Nuevo León	NLE	62800	peripheral
Morelos	MOR	60400	central
Sinaloa	SIN	58200	peripheral
Chiapas	CHP	47500	peripheral
Durango	DUR	44600	peripheral
Estado de México	MEX	42300	central
Tamaulipas	TAM	42000	peripheral
Tabasco	TAB	39800	peripheral
Aguascalientes	AGU	39100	peripheral
Zacatecas	ZAC	38600	peripheral
Tlaxcala	TLA	35500	central
Coahuila	COA	33800	peripheral
Colima	COL	31300	peripheral
Nayarit	NAY	31200	peripheral
Campeche	CAM	27600	peripheral
Baja California	BCN	27400	peripheral
San Luis Potosí	SLP	27300	peripheral
Baja California Sur	BCS	24400	peripheral
Quintana Roo	ROO	22500	peripheral

Figure 3.1. Mexican states, showing those within 200 miles of Mexico City.

If *moles* were evenly distributed throughout the thirty-two states, this dataset should have a normal (i.e. bell curve) distribution. However, this data shows a skewness (1.365) well above the critical value of symmetry expected for a dataset of this size (.824 for n=32).[21] However, splitting this data into central and peripheral states drops the skewness of each group below this value (and since the critical value for these smaller sets is at the same time higher, skewness is well within the critical value for both subsets). Hence, both central and peripheral states show normal distributions of *mole*, even while the overall dataset does not (Figure 3.2). This in itself suggests that this division may be significant, representing two sets of normally distributed data.

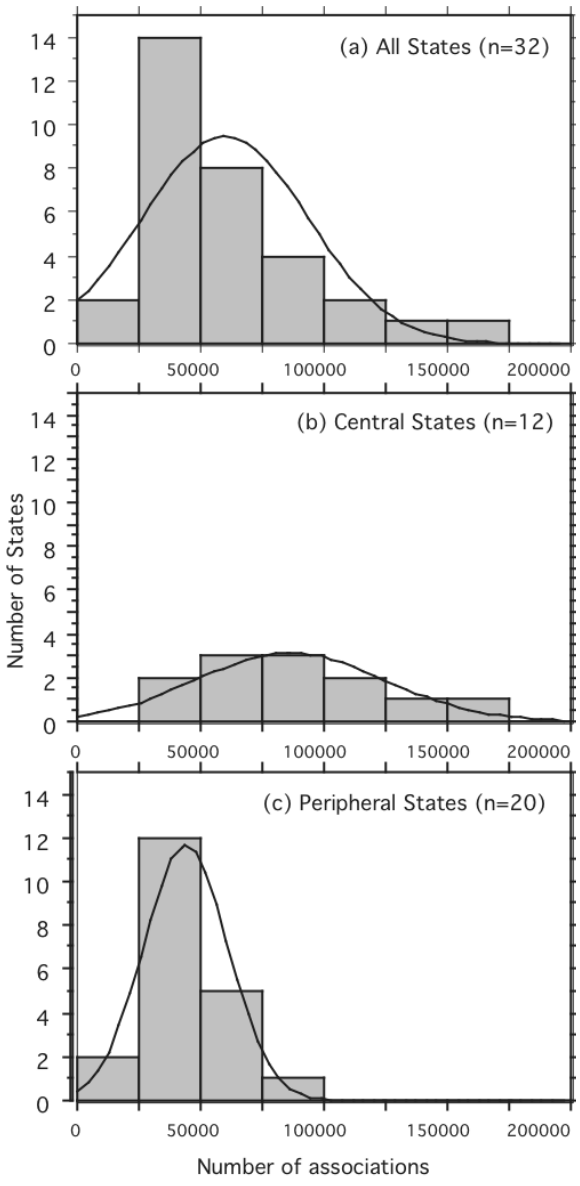


Figure 3.2. Association of Mexican states with *mole*, showing overall skew towards relatively low associations (a), but normal distributions of associations when divided into central (b) and peripheral (c) states.

Hypotheses about *mole* distribution

There are two approaches to looking at whether the association of *mole* with central states is significantly high. The first is to ask whether central states (n=12) are a fair sample of the population of states as a whole (n=32). This counts the central states twice, but in a population this small excluding them would change the resulting population. In doing this it is better to distinguish the remaining states from the population, and articulate this as a test of the difference between central states and peripheral states. These two approaches can be expressed using null and alternative parametric hypotheses.

[21] See Appendix B for full descriptive statistics.

1) $H_0(1)$: $\mu_C - \mu_N = 0$; there is no difference in the number of search results for *moles* associated with central states from the national average.

   $H_A(1)$: $\mu_C \neq \mu_N$; there is a significant difference in the number of search results for *moles* associated with central states from the national average.

2) $H_0(2)$: $\mu_C - \mu_P = 0$; there is no difference in the number of search results for *moles* associated with central states and those associated with peripheral states.

   $H_A(2)$: $\mu_C \neq \mu_P$; there is a significant difference in the number of search results for *moles* associated with central states and those associated with peripheral states.

Non-parametric hypotheses are similar but would be expressed in terms of median numbers of associations rather than means. These can be evaluated through sign and rank tests and visually assessed using comparative box plots (Figure 3.3).

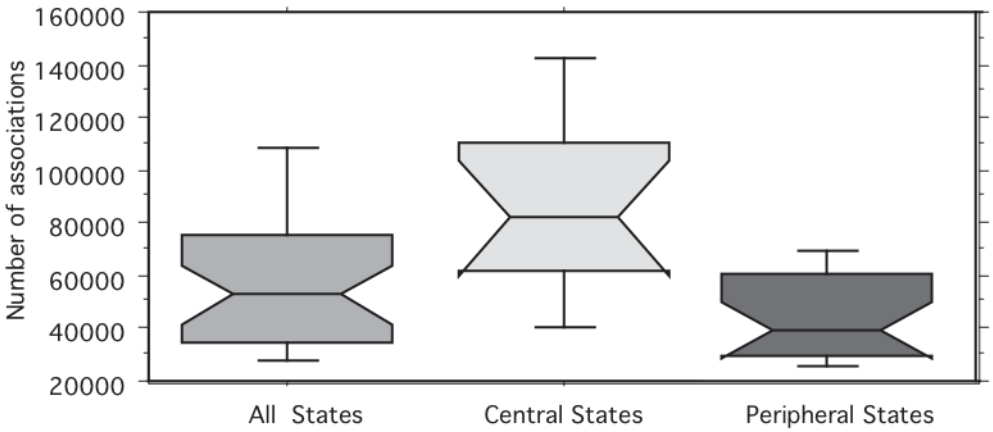


Figure 3.3. Comparative box plots of search results for mole with Mexican states overall, compared with central and peripheral states, showing medians, IQR, and 95% confidence intervals.

Examining box plots gives a rapid means of assessing whether medians are significantly different. In this case, the 95% confidence intervals (CI) around the medians of both central and peripheral states overlap with that of the larger set to which both subsets belong. But neither the 95% CI nor the interquartile range (IQR) of the two subsets overlap with each other. The box plots indicate a strong rejection of the null hypothesis in the case of the difference between central and peripheral states, and a weak acceptance in the case of the difference between central states and states in general, suggesting that this hypothesis should also be investigated by other means.

A one-sample sign test[22] comparing the subset of central states with the hypothesized median value of the overall population (52850) shows that ten states exceed this value while two fall below it, and that the probability of this distribution happening randomly is 3.86% (p-

[22] See Appendix B for details of this and following tests.

value of .0386). This is within a 5% threshold, so at 95% confidence we can reject the null hypothesis — but as it is not very much less, this rejection would be as weak as the acceptance indicated by the box plot above.

In contrast, an unpaired two-sample nonparametric test of the two subsets again yields unambiguous results. A Mann-Whitney comparison of the central and peripheral states shows a tied p-value of .0007, i.e. a probability of .07%, dramatically under the 5% threshold, indicating strong rejection of the null hypothesis and acceptance of the alternative hypothesis that the association of *mole* with central states ranks significantly higher than with peripheral states.

Parametric comparison of the subset of central states with the larger set to which it belongs is problematic both because the same data is counted twice, and because the larger dataset does not have a normal distribution. But differences between the two subsets can be tested using an unpaired means comparison. This finds that there is only a 1 in 10,000 chance (p-value .0001) of randomly generating the difference found in the means of the two subsets. A central state is likely to have 42,500 (±20,000) more associations with *mole* than a peripheral one. At least 95% of the time the difference should fall within a range of 22,500 to 62,500 (numbers are rounded to the nearest 100 because the data appears at this level of precision). Because 0 falls well outside this range, the null hypothesis can be rejected. However, the strength of this result is undermined by the high difference in the variances (nearly 5:1), which is statistically significant at 95% confidence.

Discussion

These results show the importance of articulating the research question in a useful way. Asking whether the central states comprise a fair sample of the nation does not yield an immediately clear answer. Compared with the set as a whole, the central subset shows higher associations with *mole*, but the difference is marginally significant. However, asking whether the central states differ from the peripheral ones produces a clear result: central states show significantly more associations with *mole* than peripheral states, in both parametric and non-parametric tests. Because asking the question this way avoids counting any of the data twice, and makes use of normally distributed data, this seems to be a much better way of approaching the problem. So we may as well reject not only the null hypothesis concerning the difference between center and periphery, but also both hypotheses comparing the center with the whole country.

This analysis suggests that if Mexico is a "republic of *moles*" (Chapa 2005), it is not one where all parts are equal. Rather it supports Adapon's (2008:98) observation that "*mole poblano* is considered the Mexican national dish, although it is popular and well-known only throughout the central area." This is not surprising, since the central part of the country

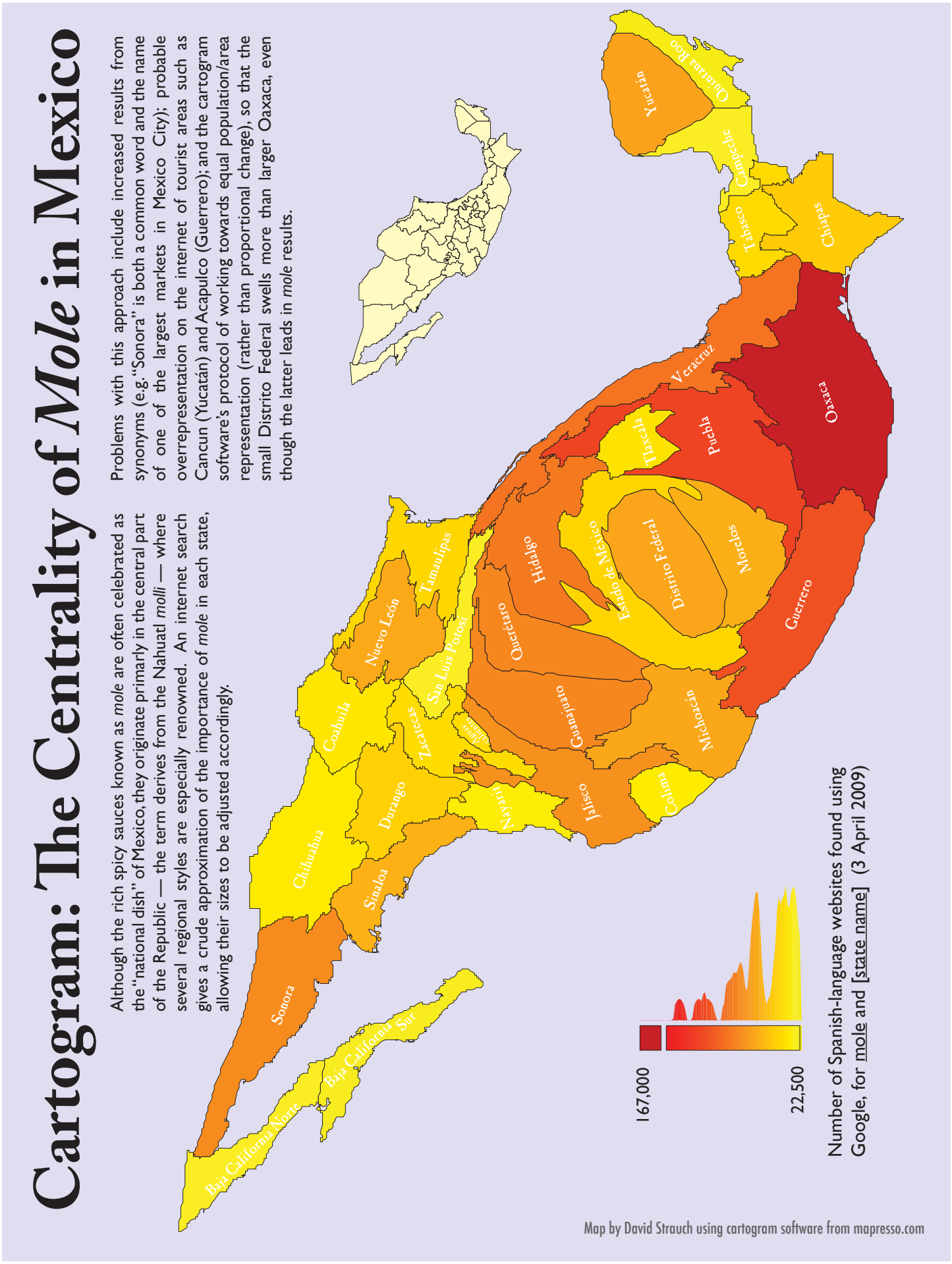
contains several areas famous for distinctive *moles*, and overlaps largely with the original cultural center of the Aztecs, from whose Nahuatl language the term *mole* derives. Yet the strength of the statistical finding of significance depends on the validity of the data, which is not extremely solid in this case.

The number of associations discovered by a web search could be skewed by sampling error in a number of ways besides those discussed above. On the one hand, less developed peripheral regions may have less internet connectivity and representation, leading to undersampling. On the other hand, differences between states may be leveled somewhat by the inclusion of state names on general sites which also discuss *mole* in other places, and by the appearance of *mole* in restaurants which reflect the national rather than the local cuisine, especially in tourist areas. Whether *mole* which occurs in these contexts should count as a regional instance is somewhat of a theoretical question, both in the sense that resolving it would depend on clarifying the research problem, and in the sense of being a question that can't be addressed with this resolution of data.

Presenting distributions

Because the dataset of Mexican states was built from a file of georeferenced polygons, and because the numbers of *mole* associations show a generally gradient pattern of spatial variation, the data can be displayed on a cartogram (Figure 3.4). Once laborious to construct, cartograms can now be constructed with available open-source software. Figure 3.4 was made using Mapresso, which progressively adjusts shapefiles towards an even density of a specified field. Shapes with greatest positive exaggeration are those with a high ratio of value to area (e.g. , the Federal District, which has grown greatly), which means that the larger states with the most associations are exaggerated less than some of the smaller ones with fewer associations. To compensate for this, states are also colored along a gradient showing the number of associations, which is itself another way of making visible the patterned variation of the data. Although this distortion in this map is immediately visible to those familiar with the country, it would be less effective to others, and so an inset map of the undistorted region has been included for contrast.

Figure 3.4. Cartogram of *mole* associations by state.



Further possibilities for the investigation of *mole* distribution

Although statistical analysis demonstrated a significant difference between the number of associations with *mole* in central and peripheral Mexican states, this result would have greater weight if built on a better sampling design. Yet it is difficult to imagine a way to evenly assess the distribution of *mole* across the country. Using recipes from cookbooks (where they are geographically referenced) compounds the issue, because each cookbook takes an idiosyncratic approach to collecting recipes. One regional cookbook may have thirty recipes for different *moles* (e.g. Arias-Rodríguez 2003), while compendia select recipes by a range of different criteria, such as culling unusual examples (Taibo 2005) or attempting to evenly represent the states (Chapa 2003). Choosing which cookbooks to use becomes a second-level sampling problem. Even an imagined dataset of all the items on offer at all the restaurants in the country would be biased in several ways, returning instances from generalized restaurants and missing *moles* privately prepared in homes and festivals. The small *molinos* where many cooks have their ingredients ground together could be surveyed, but not all *mole* is prepared in this way. Direct field sampling of *moles* would be more reliable — but would take a lifetime. As a proxy, cookbooks will provide data for subsequent sections.

Another question connected to sampling is the spatial resolution of the data. In the set used here, *moles* are only georeferenced at the state level, and the variable of centrality has been given a somewhat arbitrarily defined nominal value. This value can be treated ordinally, but it would be more useful to have continuous ratio values. To do this, the distance from the center would need to be quantified, so the data would need to be associated with points rather than polygons. This will require a choice of what point to use, at both state and national levels. One approach is to use the centroid or geographic mean point for each area, but given the crescent shape of Mexico this may yield an odd result. Using the state and national capitals may be more relevant, since these are usually the densest population centers and the likely locations of most of the associations. Once points for the states have been chosen, the geographic mean of *mole* could be determined and used as the central point instead of the capital. Given a different sampling design, this geographic mean could be determined with better resolution if records were referenced to specific locations rather than state points. By quantifying the degree of centrality, and changing this parameter from a nominal value to a continuous one, we could then test for correlation between centrality and association with *mole*.

3.2 Making sense of difference

The above analysis shows the virtual presence of *mole* to be much more characteristic of the central part of the country than of the frontiers. In light of this, claims that *mole* is characteristic

of the national territory can be read in several ways. In a purely geographic framework we can understand this as a kind of generalization, in which units at a certain scale of analysis, in this case nations, are assigned single values. The generalized value is often the one measured as a central point or centroid. This is similar to the way biologists use the characteristics of a holotype to define a taxa. However, applying the general values to finer resolutions of scale produces a false impression of specificity, and can lead to a tautological error of taking as demonstrated the assumptions one began with.

However, in evaluating discursive claims it is worth remembering that people employ a range of tropes beyond strict referentiality. It is less interesting to show that claims may be literally wrong than it is to understand the ways in which they might be right, and how they would be put to use. In territorial claims about *mole* we can see a synecdochic trope, in which the part is taken for the whole. Both generalization and tropes are consistent with a more political reading, i.e. that the center works to inscribe its own values in the marginal areas over which it claims sovereignty.

3.3 Greater Mexico, Greater Mesoamerica

Another way to read the claim that the distribution of *mole* is equivalent with that of Mexico is to take it as definitional, that is, defining the nation not as a bounded territorial space but as an embodied identity located in performance.

In this sense the nation is understood as a people; Mexico is where there are Mexicans. This group identity extends well beyond ethnicity, incorporating diverse indigenous groups as well as mestizos and Euro-Mexicans. As a "category of practice," this broader sense of nation is largely consistent with the imagined mestizo national character, and can be extended to include communities located outside of the territorial boundaries of the nation state.

To some degree this embodied nation is reterritorialized in the concept of Aztlán, the name that Chicanos gave to the lands which Mexico lost to the US in the 1840s (including California, Nevada, Arizona, New Mexico and Colorado), countering their characterization as immigrants with the claim that "we didn't cross the border — the border crossed us." Although not generally using the term Aztlán (which refers to the mythic homeland of the Aztecs), people in Mexico are highly aware that this region was part of Mexico, which seems to render it less foreign, as though it retained an aura of Mexicanness. Many Mexicans have been to *el otro lado* ("the other side"); the border seems to be widely regarded less as an impenetrable barrier than a means by which the crosser reorganizes possibilities of identity and economy.

Especially in recent decades, Mexican expatriates have moved beyond the US Southwest to settle in other parts of North America. A bumpersticker I saw in Montana reading *Oaxaca vive en mi* ("Oaxaca lives in me") conveys this sense of the embodied nation far from *la linea* ("the

line"). The idea of nation as a people extends beyond the former territories of the state to include other areas where Mexicans have settled. This embodied nationalism is not simply inherent in expatriates, but is routinely performed. Consuming iconic foods is a key part of this performance, as in the case of a *mole* delivered by courier from Oaxaca to New York as part of a wedding ceremony (Pratt 2006:326ff). The supranational term Greater Mexico has been used "to consider Mexican-origin populations living within Mexico as well as those in the United States" (Pérez and Abarca 2007).

While Greater Mexico is most frequently used as an inclusive term for contemporary and recent historical culture,[23] it has also been used by biogeographers (Yetman 2007), perhaps drawing on Rzedowski's (1991:11) mapping of "Megaméxico" (fig. 3.5b) using aggregate species ranges. A similar term, Greater Mesoamerica, has been used for longer time scales of both culture (Foster and Gorenstein 2000) and ecology (Giri and Jenkins 2005). The similarity of these concepts is the definition of place by aggregated lived experience, producing definitions of regions with fuzzy boundaries. There remains something of a discrepancy between the ecological Mesoamerica and the cultural one, with the region between sometimes called in Mexico, La Gran Chichimeca, and in the US, the Greater Southwest.

Figure 3.5. a) An ad campaign exploiting the cultural identification of Greater Mexico (Bonello and Johnson 2008); b) the ecological Megaméxico (from Rzedowski 1991:11).

3.4 The rainbow of mole

As well as representing Greater Mexico, *mole* also marks regional identities within Mexico. The state of Oaxaca, a central state in my central/peripheral distinction above, is especially noted for its *moles*, and while Mexico is nationally represented by *"mole"* as a unitary object, i.e.

[23] The term was popularized by folklorist Américo Paredes, and is now treated as a normalized concept in Chicano literature (e.g. Limón 1999, Saldívar 2012).

"the national dish," Oaxaca is celebrated as "the land of seven *moles*" (Pilcher 1998:50, Rittman 2008). It is not just the food but the diversity itself that symbolizes this southern state, which has been described as the most diverse in Mexico both ecologically and culturally, and perhaps the most indigenous (Henestrosa Ríos de Webster 2000).[24]

The *moles* of Oaxaca are characterized as a rainbow of many colors. Prominent among these are black, green and yellow — *mole negro*, *mole verde* (or sometimes simply *verde*), and *amarillo* (or more rarely *mole amarillo*) — and red in three shades: *mole colorado (*sometimes called *mole rojo)*, *mole coloradito*, and *mole chichilo*.[25] These are six, and there are supposed to be seven, but the last is problematic; the list is usually completed with *manchamanteles* ("tablecloth-stainer"), *almendrado* (Noble 2008:94, 108) or *estofado* (Geddes 2000:120, Gold 2000:123).[26] E. N. Anderson (2006) points out that the comparison of the spectrum of variously colored *moles* with a rainbow is not coincidental:

> Oaxaca is famous for the kaleidoscopic variety of its moles, classically described as coming in "seven colors"— this phrase is another bit of Arab influence, since "seven colors" is a standard Middle Eastern metaphor for "all the colors of the rainbow" and thus "wondrous variety."

Despite the elasticity of this metaphor, people continue to try to find a list of seven types, which are sometimes considered representative of the "seven regions" or "seven ethnicities" of Oaxaca, but these enumerations are equally problematic, since listings of ethnicities vary, as does regionalization, and probably also reflect the wondrous variety of cultures and geography in Oaxaca.[27] Here, what is used to construct the "groupness" of Oaxacans, to use Brubaker's

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[24] Curiously, in Mexico City, "Oaxacan tamales" are sold by street vendors who appear in indigenous Oaxacan dress, although these are wrapped in leaves of banana (an introduced species) rather than corn (a native one).

[25] Karttunen (1992) notes that the related Nahuatl words *chīchīlihu(i)* (to become red), *chīchīloā* (to make something red) and *chīchīltic* (something red) rely on the root word for chile pepper, *chīl*, which "in compounds often conveys the sense 'red'."

[26] The order of the list may vary; in her *Search for the Seventh Mole*, Susan Trilling includes *manchamanteles* as the sixth and discovers *chichilo* as the seventh (Trilling 1996:17). Raghavan (2007:235) notes that despite being known for seven *moles*, Oaxaca really has eight. Pilcher (1998:50) points out that *verde* was not classed as *mole* in nineteenth century cookbooks, which may not be surprising considering their orientation to elite (*Creole*) audiences.

[27] Lewis' (2005) "seven ethnic groups" are Chinanteco, Mazateco, Mixe, Mixteco, Triqui, Zapoteco, and Zoque. The National Institute of Geographic and Information Statistics (INEGI) divides the state into twelve regions (Cañada, Mazateca, Mixteca Baja, Mixteca Alta, Chinantla, Sierra Zapoteca, Región Mixe, Valle de Oaxaca, Mixteca de la Costa, Sierra del Sur, Istmo, and Chimalapas). Poole (2005;150n49) lists "seven ethnic or cultural regiones" — los Valles Centrales, la Sierra de Juárez, la Cañada, Tuxtepec, la Mixteca, la Costa, and el Istmo de Tehuantepec — but also (2005:129n5) points out that while the "official tourist cosmology" embraces seven ethnicities, there are sixteen distinct ethnolinguistic groups in the state. Although it may be claimed that "each of the state's seven regions produces a unique variation of the spicy mole sauce" (CONAFOR 2010), these are never isometrically mapped, and it would be strange to do so, since cooks in any region may (and certainly do) make more than one type of *mole*.

term, is not their similarity but their diversity. Hernández de Valle-Arizpe (2010:44) shows the same is true for Tlaxcala, a Central state bordering Puebla to the north, and having:

> a great variety of *moles* — *moles* which have nothing to do with the archetypical *mole poblano*, but which consist more of spicy stews: *mole de olla*, cinnamon *mole*, turkey *mole*, lamb *mole*, *mole de huitlacoche* [corn fungus], chicken *mole* with epazote. … Such are our *moles*, as diverse and at times as contrary as the imagination of their makers.[28]

Table 3.2. Subregionalizations of Oaxaca ("√" indicates inclusion in source).

Subregions	Culinary Institute of America 2015	Poole 2005	Kennedy 2010	INEGI 2010
Chimalapas				√
Chinantla			√	√
Ciudad de Oaxaca			√	
Costa	√	√	√	
Istmo	√	√	√	√
La Cañada	√	√	√	√
Mazateca			√	√
Mixteca	√	√		
Mixteca Alta			√	√
Mixteca Baja			√	√
Mixteca de la Costa				√
Región Mixe			√	√
Sierra de Juárez		√	√	
Sierra del Sur	√		√	√
Sierra Norte	√			
Sierra Zapoteca			√	√
Tuxtepec	√	√		
Valle de Oaxaca				√
Valles Centrales	√	√	√	

The construction of regional identities is not at odds with nationalist projects, as Agnew (2002) finds in national elections in Italy, where the Lega Nord (Northern League) draws on and builds regional identity as part of its nationalist positioning. Appadurai (1988) has similarly argued that the creation of a national cuisine depends upon creating a canon of regional specialties, a means of gastronomically mapping the national territory.

[28] "En Tlaxcala existe una gran variedad de moles; moles que nada tienen que ver con el arquetípico mole poblano, sino que consisten más bien en caldos picosos: mole de olla, mole de canela, mole de guajolote, mole de carnero, mole de huitlacoche, mole de pollo con epazote. … Así son nuestros moles, tan diversos y a veces tan contrarios como la imaginación de quien los ensaya."

3.5 Other local traditions of mole

While Oaxaca and Tlaxcala celebrate the diversity of their *mole* at a regional level, there are other localized *moles* which are considered characteristic (*tipico*) of the localities where they are found, and often named for their municipality.[29] The most famous of these is probably *mole poblano*, which almost certainly takes its name from the city of Puebla rather than the state, the latter of which also includes a great diversity of other *moles*. Puebla is also central in my distinction between Central and Peripheral. One *mole* from the Oaxaca/Puebla border is made with goats kept grazing on dryland vegetation, which is believed to concentrate the flavor of their meat; the *mole* is prepared annually at an event called the Slaughter (*Matanza*), which gourmets from Mexico City may make a type of pilgrimage to attend. Tasting regional dishes is usually considered an indispensable part of visiting other parts of the country, and travelers are often advised about the specialties they shouldn't miss. For example, the small town of Xico in the state of Veracruz is famous for an eponymous *mole* sweetened with fruit, which may be sampled at most of the restaurants in town (along with a famous soup made with the leaves of a local species of morning-glory called *xonequi* (*Ipomoea dumosa*)). Proceedings from a 2004 conference on *mole* (Iturriaga 2004) were published as part of the Guides and Publications on Cultural Tourism produced by the National Council for Culture and Arts (CONACULTA).

Sixteen of the sixty-nine *moles* listed by Muñoz Zurita (2012) have geographical names (Table 3.3). Two of these refer to indigenous groups/regions of Oaxaca, so it is ambiguous whether they name the people or the region, e.g. the *zona mixteca* (or if such a distinction is even meaningful). Similarly, *Costeño* may equally refer to the people who make the *mole*, and the term *Jarocho* refers to an inhabitant of Veracruz, and might be considered a type of ethnic/regional identity (similar terms include *Tapatio* for Guadalajara and *Chilango* for the Federal District). Three other terms refer to classes of people — peasant, indigenous and cowboy — and one, *ranchero*, refers to country life; all of these may be taken as an indication of rurality.

[29] Within states, the next administrative level is the *municipio*, comprised of towns and the surrounding countryside; it is similar to the idea of "county" in English.

Table 3.3. *Moles* with place-based names in Muñoz Zurita 2012.

Place-named *mole*	Translation	Scale
Mole de Castilla	Castillian *mole*	National
Mole estilo Morelos	Morelos-style *mole*	State
Mole costeño	Coastal *mole*	Physiogeographic
Mole miahuateco Mole mixteco	Miahuatecan *mole* Mixtecan *mole*	Ethnicity / Region
Mole campesino Mole indio Mole ranchero Mole vaquero	Peasant *mole* Indigenous *mole* Ranch-style *mole* Cowboy *mole*	Class / Region (Rural)
Mole de Chilapa Mole de Huajuapan Mole de Tonatico Mole de Xico / Mole xiqueño Mole tehuipanguense	*Mole* from Chilapa *Mole* from Huajuapan *Mole* from Tonatico *Mole* from Xico *Mole* from Tehuipango	Municipal
Mole jarocho Mole poblano	*Mole* from Veracruz *Mole* from Puebla	Municipal/State

An interesting contrast to the municipalities famous for their own particular *moles* is the town of San Pedro Atócpan, in the outskirts of the federal district, which claims to be the national capital of *mole* and hosts a yearly National Mole Fair. Most of the numerous producers who participate are located in San Pedro Atócpan itself and offer multiple styles of *moles*, including a "Oaxacan-style mole" (*mole estilo Oaxaca*), which in this case means a *mole negro*, but one made in San Pedro Atócpan without the endemic Oaxacan *chilhuacle* chiles which define the dish in Oaxaca. Instead, the *mole* is darkened with roasted chile seeds, which give the dish a particular flavor. Because San Pedro Atócpan produces a good deal of the *mole* consumed in Mexico City — festival promoters claim 90% without citing references — there may be more consumers of *mole estilo Oaxaca* than there are of Oaxacan *mole negro* itself, and they may find its taste more authentic than the subtler flavors of the latter, a classic case of simulacra in which the representation of the thing becomes preferred to the thing itself.

IV. The complexity of *mole*

When one of the first Europeans to travel through Mexico was asked about its topography, he famously seized a piece of paper and crumpled it up and said, "That is what the land is like."[30] Toledo et al. (2010:7) elaborate:

> Due to its geographic location, its geological history, and its heterogeneous topography, Mexico represents an exceptional setting for the multiplication of species. The confluence of Neartic and Neotropical vegetation lineages that occurs in the mountain ranges offers a complex network of biogeographical locations in the form of a mosaic, which gives place to innumerable niches that are relatively small in size.

Mexico's high degree of topographical variation has been associated with its rich biological and cultural diversity (Sarukhán et al. 2009). Elevations vary from sea level to over 18,000 feet (within 65 miles), and the country spans more than 18° of latitude. It is the fourth most biodiverse country in the world, despite being only fourteenth in size (Vásquez Domínguez 2003:370), and was one of the first six "megadiverse" countries identified by Mittermeier (1988:152), which contain at least 10% of the world's species (Ceballos et al. 1998). Skutnabb-Kangas et al. (2003:28) apply an analogous rationale to linguistic hotspots and include Mexico as one of the nine linguistically megadiverse countries. Ethnoecologists have shown correlations between biological and cultural diversity (Bye and Linares 2000, Maffi 2005, Pfeiffer and Voeks 2008), arguing, basically, that the richer the species diversity, the more kinds of culture can develop. Loh and Harmon rank Mexico as the eleventh highest country in biocultural diversity worldwide.

It is little surprising, then, that one of the most commonly cited attributes of its national dish is its complexity. This is often expressed in terms of the great number of ingredients brought together in *mole*. This chapter will first examine the complexity of *mole* in its simplest form — the number of ingredients used in a dish — and assess whether a collection of recipes drawn from a range of published sources shows a consistent indication of complexity in this form.

4.1 Counting ingredients

To consider the question of ingredients in *mole*, I assembled a dataset of 360 published recipes, with recipes classed by region, culture, type, centrality (as described in chapter 3) and source.[31] The only quantifiable attribute of the recipes was the number of ingredients, and only 282 of the recipes had unambiguously countable ingredients.

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[30] This story of Hernan Cortés' interview with Carlos I is likely apocryphal but nevertheless often repeated as an apt illustration of the terrain (Carballo and Pluckhahn 2007:609).

[31] See Appendix B for a full description of this dataset.

As with the number of *moles* by state, the overall dataset was highly skewed, i.e. there was no normal distribution of the number of ingredients across all recipes, which would be expected if this were a set of data of like kind. This suggests that the overall collection of recipes does not represent a cohesive category, and would be better analyzed if it could be separated into more cohesive subgroups. There are several ways of doing this that make sense.

The first of these is to consider *mole* by type. Most of the recipes fell into one of eleven types of named *mole*: *amarillo, colorado/coloradito, de guajolote, de olla, molito, negro, pipián, poblano, rojo, tesmole*, and *verde*. Five of these types (*colorado/coloradito, de guajolote, negro, poblano,* and *rojo*) belong to a broader category of *mole de olor* (fragrant *mole*), or red *mole* in the broader sense.

Table 4.1. Number of ingredients of *mole* distributed by type.

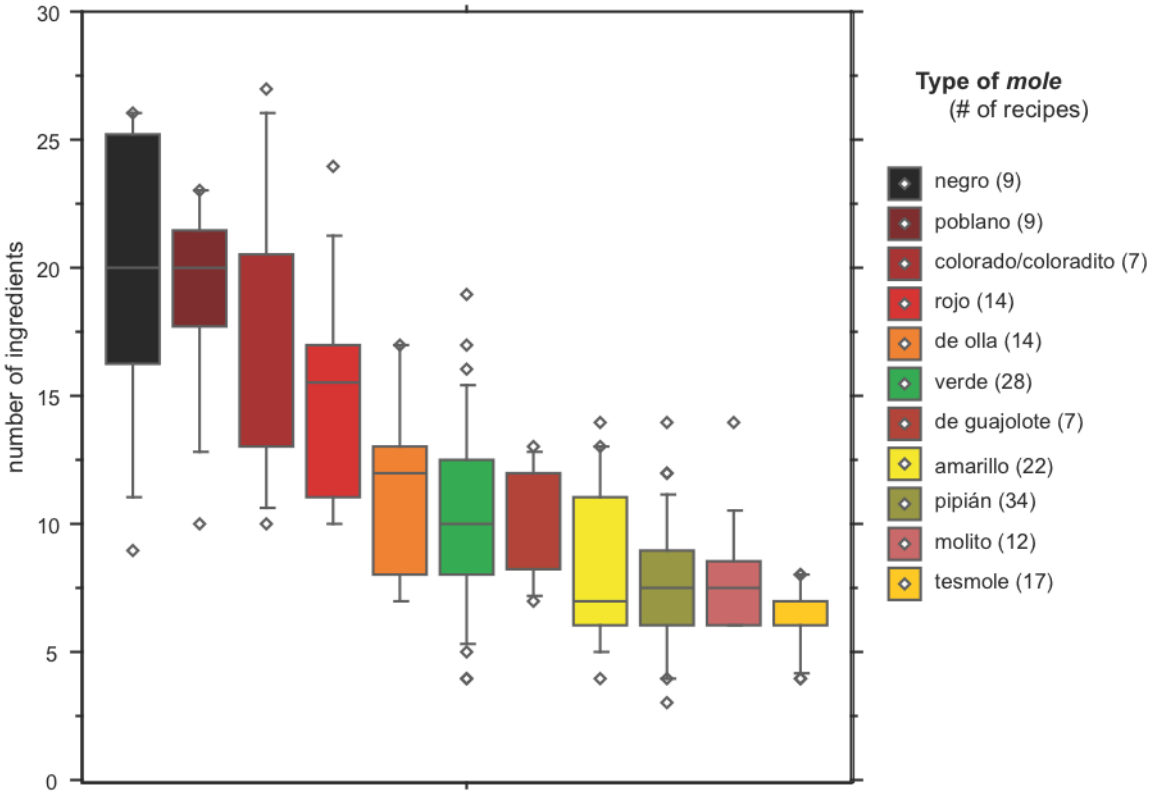
Mole Type	all *moles*	*amarillo*	*colorado / coloradito*	*de guajolote*	*de olla*	*molito*	*negro*	*pipián*	*poblano*	*rojo*	*tesmole*	*verde*
# Recipes	282	22	7	7	14	12	9	34	9	14	17	28
Max. Ingr.	31	14	27	13	17	14	26	14	23	24	8	19
Median	9	7	13	12	12	7.5	20	7.5	20	15.5	6	10
Min. Ingr.	2	4	10	7	7	6	9	3	10	10	4	4
Mean	10.6	8	16.3	10.4	11.1	7.8	19.8	7.7	19.1	15.1	6.3	10.1
Range	29	10	17	6	10	8	17	11	13	14	4	15
IQR	6	5	7.5	3.75	5	2.5	9	3	3.75	6	1	4.5
Skewness	1.136	0.829	0.864	-0.391	0.429	1.767	-0.57	0.418	-1.333	0.429	-0.368	0.43
g1	0.286	0.976	>1.416	>1.416	1.186	1.264	1.416	0.801	1.416	1.186	1.093	0.876

Although the dataset as a whole is quite skewed (sk=1.136 compared to a critical value of 0.286), it can be seen that most types have dramatically lower skewness. The two exceptions, *molito* and *poblano*, each result from one outlier; removing these drops the skewness of *poblano* from -1.333 to -.077, and the skewness of *molito* from 1.767 to .197. Critical examination of the outliers finds justification for removing each one. The term *poblano* means from Puebla, but as a modifier of *mole* it refers in gastronomical culture to an iconic, usually elaborate dish, prepared across the Republic. The outlier in this group comes from a cookbook from the ethnographic *Cocina Indígena y Popular* series and probably uses the modifier in its literal sense to refer to a rural dish from the state of Puebla, rather than the iconic dish of the state's eponymous capital; none of the other exemplars of this type comes from this series. The term *molito* derives from *mole* with an added diminutive, *-ito*, generally used to imply something simple and quotidian. The outlier, however, is a festive dish, and probably uses the diminutive in what may be an ironic sense of false humility, in the same way that people may refer to their well-apportioned houses as "humble homes." If the outlier of *molito* is discounted, all *mole* types have skewness

within the critical values of symmetry. The rather heterogeneous dataset assumes more normal distribution if it is sorted into the categories in which people conceptualize and create *mole*.

The different profiles of complexity of different *mole* types (in terms of number of ingredients) can be seen in a box plot of ingredients by type (Figure 4.2). The range in number can be seen in the length of the boxes showing the interquartile range, the lines extended to 10th and 90th percentiles, and the plotted outliers. We could mathematically expect that dishes with a greater average number of ingredients would also show a greater range (since, in contrast to the coefficient of variation, range is expressed in absolute numbers rather than relative to the average) and this visually appears to be generally true, except in the cases of *mole poblano* and *mole amarillo*. The former is the most famous type of *mole*, and this may foster some degree of standardization which has reduced its range. The latter is an interesting anomaly which suggests that further consideration might be productive.

Figure 4.1. Comparative box plots of the number of ingredients in eleven *mole* types.

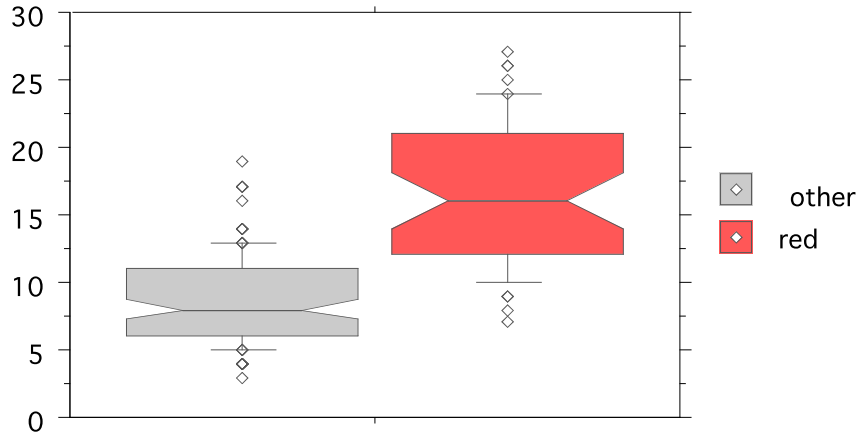


Another interesting pattern visible in these plots is an apparent threshold of about twelve or thirteen ingredients, which seems to divide the types of *mole* into two groups. This generally corresponds with a simpler typology of the dish, in which the more complex types fall into a category sometimes call *mole de olor* (fragrant *mole*) or "red" *mole* in a more generalized sense. Here again there is an anomaly: I would expect that *mole de guajolote* (turkey *mole*) would fall

into this category as well, and this again suggests an area towards which I will want to turn more attention.

This visual pattern can be tested by grouping the types into larger categories of "red" and "other" *moles*. In this classification I will stick with my prior understanding of red *mole* and include *mole de guajolote* in this category. Looking at a comparative box plot of these two groups (Figure 4.2), with 95% confidence intervals included, shows that there is a significant difference in the median number of recipes in each category. Not only do the confidence intervals fail to overlap each other, neither do they overlap the central 80% of the data in the other group; that is, less than 10% of each set falls within the 95% CI of the other.

Figure 4.2. Comparative box plots of ingredients in "red" *mole* versus other types.

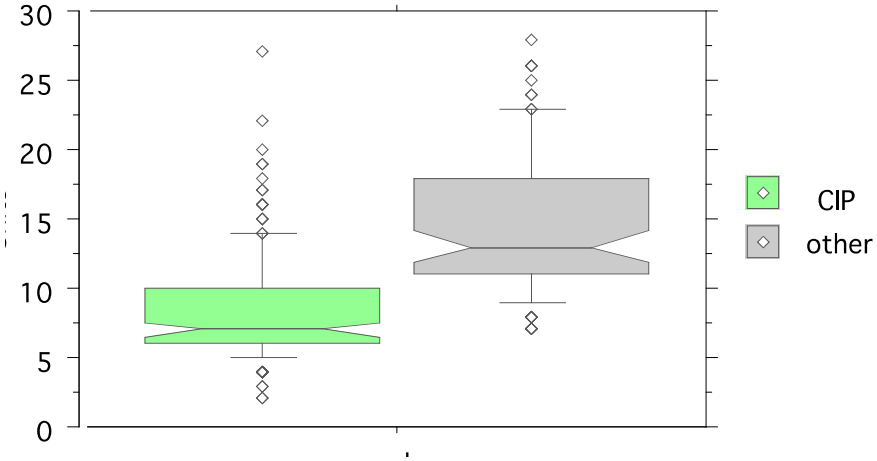


The strength of this distinction of red *mole* from other types leads me to again question why *mole de guajolote* should be anomalous, and closer examination of the dataset suggests a possible reason. All eight recipes for this type (including one that was excluded for having an unquantified number of ingredients) were drawn from a series of "Popular and Indigenous Cookbooks" published by the National Council for Culture and the Arts (Iturriaga 1999-2001), mentioned in the discussion of *mole poblano* above. The purpose of this series was to document and celebrate the cuisines of various groups within Mexico, and so its orientation is much more towards descriptive ethnography than towards the elaboration by which more urbane cookbooks often distinguish themselves. Recipes describe how foods are prepared in rural areas where cooks rely more on local resources and may not have the range of ingredients available in cities. As noted above, the outlier in the *poblano* group came from this series, and contained enough fewer ingredients to skew the distribution of the type. This suggests that it is worth asking whether the recipes in this *Cocina Indígena y Popular* series differ significantly from those from other sources.

Again, comparative box plots (Figure 4.3) immediately reveal a striking difference. As in the comparison between red and other *moles*, neither the confidence intervals nor the IQRs

overlap, demonstrating a statistically significant difference in the median number of ingredients found in *Cocina Indígena y Popular* recipes compared to those from other sources.

Figure 4.3. Comparative box plots of the number of ingredients in recipes in the *Cocina Indígena y Popular* (CIP) series and recipes from all other sources.



Although this collection of recipes shows an overall skew, separating recipes by type dramatically "normalizes" the dataset (although there may be some problem in setting up analyses that confirm their own categorical assumptions). Using graphic exploratory analysis, it is possible to visibly discover a difference in complexity among types which corresponds to a larger scale division of *mole*, and to confirm the statistical significance of this difference. Descriptions of *mole* that emphasize its complexity are probably implicitly referring to this type of *mole*.

The number of ingredients also varies significantly according to the source from which the recipe is drawn. Although this was demonstrated only by a comparison of recipes from the *Cocina Indígena y Popular* series with those from other sources, the implication is that authorial or editorial concerns can shape the data, and that this could affect the overall analysis. In the case of the *guajolote* type, a pattern deriving from publication bias (fewer ingredients) appeared to class the data in the non-red type. Other publication bias may be more subtle and difficult to sort out from culinary typology.

4.2 The complexity of complexity

Is mole complex? This statistical exercise shows that number of ingredients in *mole* recipes is not normally distributed across the data set, and is not always very high. So the persistent identification of complexity with *mole* suggests two possibilities: 1) in this identification, the term *mole* is used in a restricted sense to identify only those dishes which do have a greater

number of ingredients; and/or 2) complexity is better understood as something other than the number of ingredients.

The significantly higher number of ingredients in the red *moles* supports the idea that these may be what is meant by *mole* in the claims for its complexity, particularly when the dish is named as *mole poblano* — understood to be referring to the iconic urban dish, rather than the spectrum of *moles* found within Puebla state. The difficulty with this proposition is that it is at odds with the first discursive claim examined, i.e. that *mole* is found throughout the republic. If this is not exactly true for *mole* in general, it is even less true of *mole poblano* in particular, especially in other regions rich with their own varieties of *mole*. It may well be easier to find *mole poblano* in Cancun — or San Antonio — than to find it in Oaxaca.

However, it may be that ascribing complexity to the assemblage of ingredients is a metaphoric way of talking about other levels of complexity, since perceived culinary complexity is itself not a simple subject. One of these levels is the complexity of flavor found in *mole*, which may be partly ascribed to the main component of most *moles*, dried chiles, which are themselves full of complex flavors. Perhaps not surprisingly, much of the literature on chiles focuses on their most salient characteristic, their piquancy, which is quantifiable in terms of Scoville heat units (SHU). Yet piquancy alone is not enough to explain the huge differentiation of chiles in Mexico, where people not only distinguish between classes of chiles, but are very demanding about the particular varieties they use, where they are grown (i.e. *terroir*), and even the individual chiles. Sahagún describes a market stand in the sixteenth century:

> The chile seller. … sells mild red chiles, broad chiles, yellow chiles, *cuitlachilli, tempilchilli, chichioachilli*. He sells water chiles, *conchilli*; he sells smoked chiles, small chiles, tree chiles, thin chiles, those like beetles. He sells hot chiles, the early variety, the hollow-based kind. He sells green chiles, sharp-pointed red chiles, a late variety, those from Atzitziuacan, Tochmilco, Huaxtepec, Michoacán, Anauac, the Huaxteca, the Chichimeca. Separately he sells strings of chiles, chiles cooked in an olla, fish chiles, white fish chiles. (quoted in Coe 2004:93)

If these single ingredients are complex in flavors, then *moles* which combine several varieties, remixing different qualities selected over millennia of cultivation, are yet more so — even before adding in the array of intensively flavored spices and other ingredients.

At a broader scale, complexity may refer to the whole spectrum of *moles*, which the above analysis showed to be too varied to be treated as a uniform whole. There is ongoing debate about what counts as a *mole*. While *mole verde* and *amarillo* are almost always numbered among the seven *moles* of Oaxaca (by those who count them), I have also met cooks and fellow diners there who say they are not *moles* at all. The lack of definition is scarcely troubling to gastronomes, who take it as an incitement to further exploration, and their appreciation of variation is connoisseurship, a celebration of what Adapon (2008) calls culinary art.

Irvine and Gal (2000) have called the multiscalar ideological claims made about national languages "fractal recursivity," which may be a useful term to apply here, because they understand it as part of the power-laden relationship of nation-builders to the domains which they are claiming. Ayora Díaz (2010) argues that this is applicable to the appropriation of regional cuisines by nationalist ones (following Appadurai 1988), and in particular to the emblemization of national cuisines with iconic dishes, producing standard variants which may tend to erase local difference. This is probably not the case with all types of *mole*, whose regional variety is treasured, but ironically, the characterization of *mole* as uniformly complex is itself a kind of simplification obscuring the actual complexity of the dish.

V. Weighing ingredients

While the cultural meaning of mole is identified with the origin of its ingredients, enumerating and weighing these is more complicated than it first appears. In *The True History of Chocolate*, Sophie and Michael Coe (Coe and Coe 2007:214-215) provide a recipe for *mole* along with an exemplary statement of the argument that *mole*'s "true, creolized and hispanicized nature is given away by this list of ingredients from an authentic recipe. … Ten of these 19 ingredients are Old World." Their choice of this recipe makes it a good one to examine, although it is worth noting a couple of potential biases. Since it is drawn from Ignacio de la Mota's (1992) *El libro del chocolate* (*The book of chocolate*), a cookbook published in Spain, it is certainly not surprising that it includes chocolate, which is not found in all *moles*, and which numbers among the New World ingredients. On the other hand, this source might be expected to favor ingredients readily available in Spain, which could preclude some Mesoamerican ingredients, readily available in Mexico, which haven't yet become globally distributed.

The counting of ingredients which reveals the "nature" of the dish is treated as common sense, needing no explicit rationale. Yet there are several scalar assumptions built into this argument. The first is that a hemispheric scale is the appropriate level of geographical analysis, based on the assignment of all New World ingredients to the indigenous culture and all Old World ingredients to the colonial culture, a question dealt with at greater length in the following chapter. The second assumption is that the ingredients themselves are discrete and that enumerating them is the best way to evaluate their relative importance. However, there are other ways to count the ingredients which yield different results.

The simplest alternative to enumerating ingredients is to weigh them. Leach and Inglis (2003) take this approach in their study of Christmas Cake recipes in New Zealand, although they focus on chronological rather than spatial variation. To assess how the relative importance of different ingredients changes over a period of eighty years, they must convert recipes into standard metric units. This is facilitated by drawing recipes from community cookbooks which use a fairly standardized set of measurements. Assessing botanical ingredients in many *mole* recipes is complicated by the heterogeneity of measurements; ingredients are specified in a plethora of ways. For instance, of the nine ingredients given for *El mole de don Julio Alejandro* (Taibo 2003:195), chiles are listed in pounds, sesame and pumpkin seeds in ladles, anise in the amount "three fingers" can hold, cloves in number (eight), cinnamon by "a little," and coriander in an unspecified amount (all to make enough *mole* for one turkey). This heterogeneity may be fine for actually cooking but frustrates the quantitative comparison of dishes across kitchens. Quantifying botanical components of these dishes is further problematized by compound ingredients. Recipes for *mole* often call for bread, tortillas, cookies, chocolate (in processed form) and stock, which are themselves comprised of multiple ingredients. Curiel Monteagudo

(2004) argues that if such compound ingredients are taken into account, some *moles* may have in excess of fifty ingredients.

All that said, some recipes may nevertheless be evaluated by making some assumptions about the ratio of volume to weight for dry ingredients. The recipe given by the Coes works well because it contains only one compound ingredient, chocolate, whose ingredients can be distributed in proportion to the ratios commonly used in Mexican chocolate tablets, and uses standard volumetric measurements, such as teaspoons and tablespoons, whose weight may be estimated (5 and 15 grams, respectively).

Weighing the ingredients in the Coes' recipe (Table 5.1) shifts the balance substantially to the New World ingredients, which outweigh those from the Old World by almost 3:1 — excluding the turkey (the least standardized of the ingredients), which would shift the balance still further towards the New World.

Table 5.1. Mole Recipe from Coe and Coe (2007:215) with weights and origins of ingredients.

PAVO IN MOLE POBLANO

	New World ingredients (9)	Old World ingredients (10+1)
	1.000 kg. mulato chillis	
	1.250 kg. ancho chillis	
	.500 kg tomatoes	
		.005 kg black pepper
		.015 kg cinnamon
	.072 kg maize tortillas	
		.500 kg lard
		.300 kg sesame
	1 turkey	
	.75 kg pasilla chillis	
		.250 kg raisins
		.021 kg garlic
		.015 kg anise seed
		.005 kg cloves
		.022 kg bread, golden-fried
	4 tablets chocolate, i.e.:	
	[.103 kg cacao	]
	[	.205 kg sugar]
	[	.026 kg cinnamon]
	[	.026 kg almonds]
	.250 kg peanuts	
	[salt to taste]	[sugar to taste]
totals:	3.925 kg (+ turkey, salt)	1.390 kilos (+ sugar)
	73.8%	26.2%

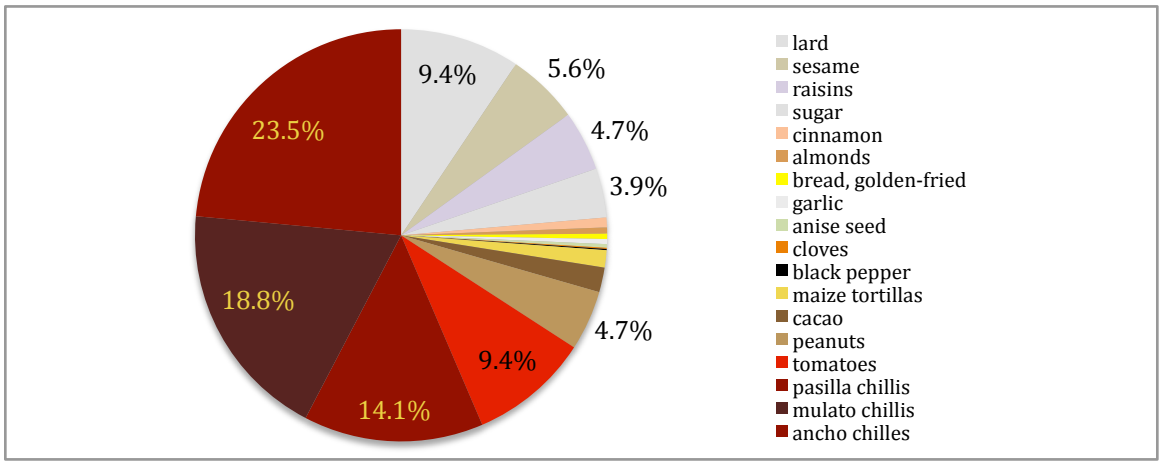


Figure 5.1. Ingredients in Coe and Coe's (2007:215) *mole* recipe by proportional weight.

Weighing ingredients introduces its own set of problems. Although Leach and Inglis (2003) used this method to assess the relative importance of different ingredients in Christmas Cake recipes over an eighty year period in New Zealand, they were comparing the same ingredients diachronically rather than different ingredients synchronically. Counting by weight may not adequately reflect the contribution of spices, since small amounts contribute potent flavors. The same is usually true of chiles, however, which are the main component of this dish.

Another problem in both counting and weighing ingredients is the question of what counts as an ingredient. Recipes often include compound ingredients, such as tablets of chocolate, which in Mexico usually contain sugar, almonds and cinnamon in addition to cacao (and in some cases other ingredients as well). For biogeographical analyses, these compound ingredients should be separated into their constituent species, but even this is not a simple or self-evident problem. Curiel Monteagudo (2004) has pointed out that while *mole* is usually prepared with stock, the ingredients of the stock are never included in its list of ingredients, which they would considerably enlarge.

5.1 Taxonomic scales

Ingredients in recipes are often given at several different taxonomic scales. A list of thirty-six common *mole* ingredients shows a hemispheric-scale pattern similar to the Coes' recipe, with a mix of ingredients from New and Old Worlds (Table 5.2). Notably, folk taxa differ from scientific classifications, although in *mole* recipes they appear to coincide more for Old World ingredients (except *Musa*), while differing on Mesoamerican ingredients. For instance, recipes often call simply for *tomates*, a word which derives from a Nahuatl category for acidic fruit. While this gives us the English word *tomato* (*Solanum lycopersicum*, or until recently *Lycopersicon*

esculentum), now one of the most widely grown of the Mesoamerican domesticates worldwide, in Mexico the generic term *tomate* is usually understood to refer to a member of genus *Physalis*, while *Solanum* tomatoes are called *jitomate*, suggesting that the former genus has greater culinary salience. A number of species are used, and some recipes are more specific, calling for a particular kind, such as *miltomate* or *xaltomate*, although these don't map isomorphically onto botanical species, since the specific modifier often names a growing condition or characteristic (e.g. from the *milpa*, or blackskinned) that might be found across several species in different contexts. *Pepitas* (pumpkin seeds) are a common ingredient and might come from four or five species of squash (*Cucurbita*), crops of Mesoamerican origin now thought to have originally been domesticated for their seeds (see Chapter 6). Similarly, *piñones* (pinenuts) may come from several different species of pines, and *nuez* (nut) is usually unspecified, and can refer to related species of pecans and walnuts; in both cases these ingredients might come from either New World or Old World species, probably depending on the relative access the cook has to local resources or the global market.

While in these cases, recipes underdifferentiate within genera — i.e. making fewer distinctions than botanists do — in another, key case, culinary taxonomists "overdifferentiate" even at the subspecific level. Most of the chiles encountered in Mexico belong to the same subspecies, *Capsicum annuum v. annuum*,[32] which is popularly differentiated into a wide variety of types, some of which are regional specialties, and some of which are of national circulation and importance. The taxonomy of chiles can be bewildering, especially because many chiles have different names when fresh and when dried, and similar chiles may be named for the places they're grown, whose denizens would fain admit that their local chile might be comparable to one grown elsewhere — New Mexico and Anaheim chiles being a case in point within the US. Not only are particular varieties salient in recipes, but most *mole* recipes call for more than one variety; indeed, this is one of the notable qualities of *mole*.

These variations in scale make it somewhat problematic to count ingredients. Enumerating ingredients at a consistent scientific level, such as species, would increase the number of some kinds of plants used (the indigenous cucurbits and *tomates*) while obscuring the important distinctions among the chiles. On the other hand, relying on folk taxonomies blurs the geographical separation of ingredients, since a number of ingredients may come from either hemisphere.

[32] There are a couple of exceptions: the *chile tabasqueño* (Tabasco chile), which is *C. frutescens*, and the complex of chiles from *C. chinense*, such as *chile manzana* and *chile habanero*, but I have not yet seen a *mole* recipe calling for any of these.

Table 5.2. Some plants used in *mole poblano*.

[New World origin]		*[Old World origin]*
	onion/cebolla	*Allium cepa*
Allium kunthii	wild onion	
	garlic/ajo	*Allium sativum*
Arachis hypogaea	peanut	
Capsicum annuum v. annuum	chiles	
"	chile ancho	
"	chile pasilla	
"	chile mulato	
"	chile chilhuacle	
"	chile costeño	
"	chile cascabel	
"	chile guajllo	
Carya pecan	pecan	
	cinnamon/canela	*Cinnamomum zeylanicum*
	coriander/cilantro	*Coriandrum sativum*
Cucurbita spp.	pumpkinseeds/pepitas (squash/calabaza)	
C. argyrosperma	"	
C. ficifolia	"	
C. maxima	"	
C. mixta	"	
C. moschata	"	
C. pepo	"	
	cumin/comino	*Cuminum cymicum*
Eryngium foetidum	sawtooth/culantro	
	clove/clavo	*Eugenia aromaticum*
Juglans spp.	walnut/nuez	*Juglans spp.*
J. mollis	nuez meca	
J. pyriformis	nuez cimarrón	
	English walnut/nuez de Castilla	*J. regia*
J. rupestris	Texas walnut/nogalillo	
	bay/laurel	*Laurus nobilis*
Lippia graveolens	Mexican oregano/orégano de la tierra	
Lycopersicum esculentum	tomato/jitomate	
	banana/plátano	*Musa acuminata x balbisiana*
	banana/plátano de tabasco	"
	plantain/plátano macho	"
	sweet marjoram/mejorana	*Origanum majorana*
	orégano	*Origanum vulgare*
Persea americana	avocado/aguacate	
Physalis spp.	tomatillo/tomate, miltomate	
P. angulata	"	
P. gracilis	"	
P. ixocarpa	"	
P. peruviana	"	
P. philadelphica	"	
P. pubescens	"	
Pimenta dioica	allspice/pimienta	
	anise/anis	*Pimpinella anisum*
Pinus cembroides & spp.	pinenut/piñon	
Piper auritum	yerba santa	
	black pepper/pimienta negra	*Piper nigrum*
	apricot/chabacano, albaricoque	*Prunus armeniaca*
	almond/almendra	*Prunus communis*
	sesame/ajonjoli	*Sesamum indicum*
Teloxys ambrosioides	epazote	
Theobroma cacao cacao	chocolate/cacao	
	thyme/tomillo	*Thymus vulgaris*
	bread/pan	*Triticum vulgare*
	raisins	*Vitis spp.*
Zea mays	corn/maiz	

5.2 Ambiguous ingredients and culinary plant complexes

In addition to the aforementioned nuts and pinenuts, onions from either hemisphere may be found in markets,[33] and there are a few herbs which are ambiguous. For instance, in Mexico, *poleo* is used for both the Mesoamerican *Satureja macrostema* and the Mediterranean basils (*Ocimum spp*.). The term *orégano* often refers to *Lippia graveolens* (sometimes called "Mexican oregano" in English), but may also be used for *Poliomintha longiflora* or *Monarda austromontana* or other species in these genera, as well as for the Mediterranean species *Origanum vulgare*, all of which are in the related LAMIACEAE and VERBENACEAE families. When *orégano* appears in a recipe it may refer to any of these species, and could be considered to form a culinary plant complex analogous to the medicinal plant complexes which Linares and Bye (1987) identified in their study of medicinal herbs sold in Mexican markets. One of the groups they studied was that of the plants known as "hierba anís," which in addition to the Old World anise (*Pimpinella anisum*, APIACEAE) includes a number of New World herbs of the ASTERACEAE: several species of *Tagetes (T. lucida, T. filifolia, T. micrantha)* and *Artemisia dracunculus*. These plants have culinary as well as medicinal uses, and both anise and *anís montes* (wild anise, *Tagetes spp*.) are used in *mole* (Katz 1996a:358). A couple of other unrelated species could be added to this "culinary plant complex"; both hierbasanta (*Piper auritum*, PIPERACEAE) and avocado leaf (*Persea americana*, LAURACEAE) are prized for their anise-like flavor and included in numerous recipes for *mole*.

Another complex is comprised of the herbs reminiscent of cilantro in flavor, known variously as *culantro*, *cilantrillo*, or *cilantro del monte*, which include the New World species sawtooth (*Eryngium foetidum*, known in Hawai'i as Vietnamese coriander) and wild carrot (*Daucus montanus*), both in the same family as cilantro (*Coriandrum sativum,* APIACEAE) and all of which have been used in *mole*; as well as several species of *Peperomia* (PIPERACEAE).

These culinary plant complexes give cooks flexibility in working with different ingredients to achieve the flavors they seek. The flexibility frustrates efforts to geographically fix the ingredients, since a recipe which called for blending flavors from the *orégano*, *anís*, and *culantro* complexes, and mixing them with onions and ground nuts, could be assembled from entirely

[33] Many authors assume that the onions used in *mole* are the now cosmopolitan *Allium cepa*, but *A. kunthii* and other Mesoamerica species are also used, and may have been used more widely in the past, before introduced alternatives became easier to acquire commercially. Even if, as Nabhan (2014:268) claims, "in the aftermath of the Columbian Exchange, nearly all of these Mesoamerican 'spice composites' carry the currents of onions, garlic, chives, or shallots from the Old World in their streams of flavors," these currents may echo the flows of indigenous *Alliums* in the past.

indigenous or entirely introduced ingredients, or any combination in between, as availability and taste dictate. A simple assignment of origins may not always entirely reflect the cultural significance of an ingredient, since the particular species used may be a structural substitute for a different species.

There is also some ambiguity in the meats served with *mole*, which are not always specified, and even when specified are sometimes substituted. Although turkeys (*Meleagris gallopavo*) are traditional and highly valued,[34] they are more expensive and difficult to raise than chickens. It is not uncommon for both meats to be cooked in the same *mole*, with guests of honor being served the turkey and everyone else the chicken (receiving turkey is understood to be a sign of esteem). Some of the other avian taxa specified in recipes — ducks and doves — are biogeographically ambiguous, since there are both native and introduced species which may be used.

[34] In Mexico, turkeys are commonly called *guajolote*, a term derived from Nahuatl, although the European term *pavo* is also sometimes used in food literature. Part of the turkey's prestige among Spanish gastronomes may come from its association with peafowl (*Pavo cristatus*), now distinguished as *pavo real* or *pavón*, which has been a symbol of opulence for centuries, though considered inferior eating (Amado Doblas 2005).

5.3 Assessing salience

Another approach to assessing the relative importance of ingredients is to measure their salience by counting how many recipes they appear in. Nguyen (2005) used this method in studying soup prepared by expatriate Vietnamese, and Thaman (1976/1977) took a similar approach in quantifying the importance of plants found in a produce market in Suva, Fiji. Despite the varying level of taxonomic resolution, Muñoz Zurita's (2012:394-398) table of *mole* ingredients provides a fairly consistent set of data with which to work. This table summarizes the principal and other ingredients of 91 *moles*, including regional varieties of *moles* with the same name. This table is thus a survey rather than a sampling of *mole*, and so represents the diversity of the dish more than it does its varietal distribution. Hence, salience values drawn from this table reflect the breadth of the term *mole*, but not necessarily the most frequent popular usage, since local specialties are given the same weight as the more common varieties (*mole rojo*, *mole poblano*, etc.).

The table lists both principal ingredients of the sauce, and other ingredients which the sauce is served with. Within the 91 *moles*, 557 ingredients are listed for the sauce, comprised of 128 named ingredients, including 35 kinds of chile, and 25 spices and herbs. The five ingredients that appear most frequently are *chile ancho* (32 times), *spices* (30), *sesame* (25), *chile guajillo* (25) and *tomato* (25). The table blends different taxonomic scales, with the chiles usually specified (though not in all recipes) while the generic term "spices" is common, although individual spices are specified in many recipes. When ingredients are grouped by category, spices and herbs occur 160 times in the recipes, while chiles occur 153 times. Chiles occur in 84 (92.3%) of the recipes, with some recipes including five different kinds.

Figure 5.2. Relative occurrence of ingredients by type in *moles* listed in Muñoz Zurita (2012:394-398).

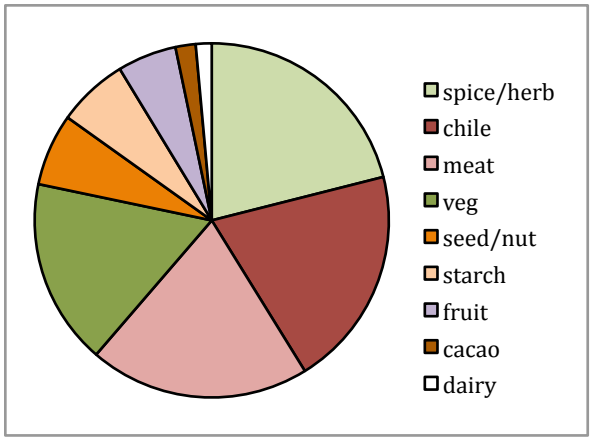
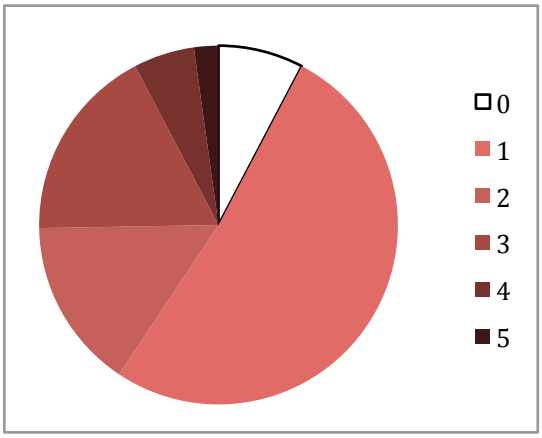


Figure 5.3. Number of chiles in *moles* listed in Muñoz Zurita (2012:394-398).



Among the 73 named ingredients served with *mole*, 27 are vegetables or grain, all but two of which are of New World origin. Of the 46 meats listed, 24 are of Old World origin, but derive from just five species (since parts of pigs/cows/etc. are listed as separate ingredients), while the 19 Mesoamerican ingredients represent 17 separate species or broader taxa (fish, frogs, etc.). One ingredient, duck, is ambiguous and may include species of both old and New Worlds.

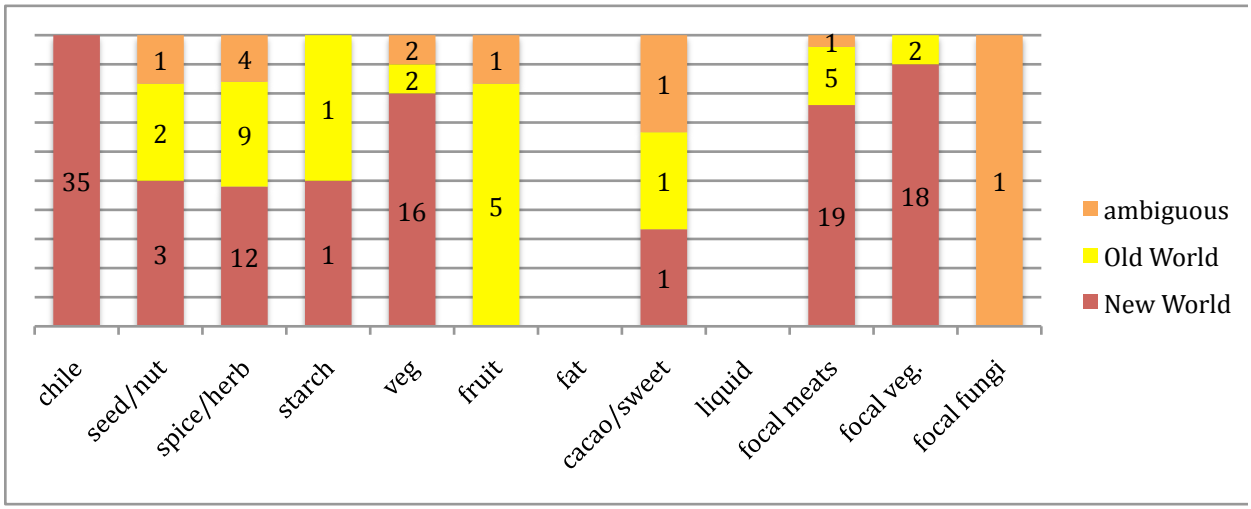
In the simplest calculation of salience, each ingredient could be assigned the value of number of recipes it appears in. A generic ingredient, such as "bread" could take the sum of the values of the specific types that appear. Applying values from Muñoz Zurita to the recipe used by Coe and Coe (2007:215), and discussed in Chapter 4, gives a total of 120 for New World ingredients, compared to 73 for the Old World, or about 8:5 — again, exclusive of the turkey (which would shift it to 9:5). If each of the values were applied to the ingredients measured by weight, the ratio of New World to Old World ingredients is over 9:1 (even without the turkey) — further undermining the claim that the "true, creolized, and hispanicized nature" of the recipe is self-evident.

Another way to think about the salience of ingredients is in terms of the structure of the dish. Many of the cookbooks which give *mole* recipes, particularly those in English whose readers may be presumed to have less familiarity with the dish, give a kind of theoretical overview of how the dish works, and group the ingredients into different functional categories. For instance, in her section on "Deconstructing Moles," Presilla (2012:768-769) divides ingredients into nine categories: Dried Chiles, Spices, Nuts and Seeds, Bread Thickeners, Basic Seasoning Vegetables, Dried or Fresh Fruits, Fat, Chocolate and Sugar, and Liquid. Other authors make slightly different divisions. I will follow Presilla with a few modifications, and add three more categories for the ingredients which usually complete the dish, either meats or vegetables or fungi. These additions sometimes give the final dish its name, e.g. *mole de guajolote* (turkey *mole*), *mole de nopales* (cactus-pad *mole*). In the analysis below, I use the

following structural categories: 1) chiles; 2) nuts and seeds; 3) spices and herbs; 4) thickening starches; 5) seasoning vegetables; 6) fruits; 7) fat; 8) chocolate, sugar and salt; 9) liquid; 10) focal meats; 11) focal vegetables; and 12) focal fungi.

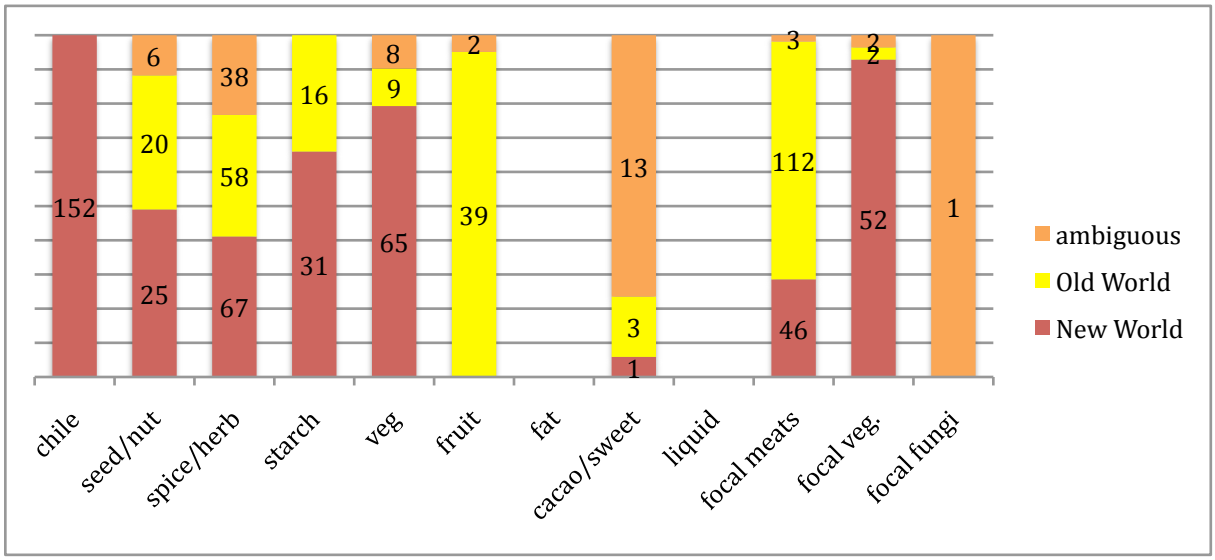
Figure 5.4 shows biogeographical proportions for the number of ingredients in each of these structural categories in Muñoz Zurita's (2012:394-398) table. The table does not include some of the components common to most *moles*, such as fats, liquid and salt. The liquid might vary from simple water to complex stock, which, as noted above, complicates that counting of ingredients. The fat most commonly used is *asiento* or lard, rendered from pigs, and hence an Old World ingredient. If this were replaced by sunflower oil, from another Mesoamerican domesticate (Bye et al. 2009), it would be an ambiguous ingredient, because while the biogeography of the plant is New World, the processing technology for extracting the oil is a later development. Similarly, in the fruit category, pineapple is ambiguous because while the species is neotropical, it has no documented use in precolumbian Mesoamerica. The fungi category is represented by only one instance in Muñoz Zurita's table, which does specify the kind, although there are a number of *moles* in the *Cocina Indígena y Popular* series which use indigenous mushrooms of various species, and Katz (1996b:58) lists sixteen types (twelve identified by species) of indigenous mushrooms used by the Mixtec, who, like academic biologists, classify them apart from plants, and may value them as a replacement for beans or meat in *mole* and other dishes (59). Although at this structural scale the spice/herb category is fairly balanced, more of the spices (7:3:2) are of Old World origin, and more of the herbs (9:2:2) New World; this may reflect the greater mobility of spices, but there may be other selective factors as well, since of the eight culinary herbs used in rural Mixtec cooking, five out of the six native herbs, but neither of the two introduced herbs, are used in *mole* (Katz 1996a:358).

Figure 5.4. Biogeographical proportion of ingredients by function.



While figure 5.4 enumerates the taxa used, figure 5.5 shows the number of occurrences of taxa within the table of *moles*. The most dramatic difference between the two ways of looking at the ingredients is in the category of focal meats served with *mole*; the five Old World domesticates are used much more frequently than the diverse range of indigenous game species, which include seven mammals, three fish, four birds, two crustaceans, a reptile, an amphibian, and an insect.[35] The cacao/sweet category increases the ambiguity, because most recipes use chocolate compounded of cacao (New World) and sugar (Old World) and sometimes other ingredients.

Figure 5.5. Biogeographical proportion of occurrences by function.



While it was relatively easy to weight the Coes' recipe by general salience, weighting it by structural salience is more difficult, because the relative importance of the structural components may vary locally. Such a calculus is beyond the scope of this study, but it is interesting to consider what it might entail. Ethnographic work would need to be done to find out which ingredients are considered most essential, and which might be substituted for others. With such work, ingredients might be assigned a replaceability value, which might have to incorporate taxonomic scales. Some ingredients might be easily replaceable within their genus, in some cases (e.g. onions, pinenuts) potentially changing the biogeographical profile, in others (e.g. tomatillos) not. Some types of chile might be replaceable, but others (e.g. *chilhuacle*) are the key ingredient which gives a *mole* its particular character. As noted above, in the discussion on culinary plant complexes, some ingredients might even be replaceable with taxonomically distant species.

[35] *Mole* is prepared with seafood or fish especially for particular occasions such as Lent, when a *mole* with shrimpcakes and *romeritos* (*Suaeda torreyana*, AMARANTHACEAE) is a traditional dish.

Although these alternate ways of measuring the ingredients are not necessarily better than enumeration, they do provide different ways of assessing the relative importance of Old World and New World ingredients. Significantly, every other way of measuring gives notably greater weight to the Mesoamerican ingredients. In other words, far from showing a self-evident balance, the Coes' example shows that the balance is achieved by carefully selecting the scale and means of measurement.

VI. Biogeography in the scales

In addition to the questions of spatial distribution, complexity, and ways of counting, another important problem underlying the discourse of *mole* is the question of its hybridity and the geographical origins of its ingredients. Addressing this requires going beyond simply counting ingredients, to describing and assessing them.

The discourse of *mole* as an exemplary mestizo dish rests on the assignments of its various ingredients to the different cultures that contribute to contemporary Mexico. This is usually done as a simple binary division between New World plants assigned to "indigenous" culture, and Old World plants assigned to "Hispanic" culture. The purpose of this chapter is to explore whether finer scales of analysis of both spatial and biological dimensions could reveal other interesting patterns, by first looking at a few of the Mesoamerican plants in detail. Three different structural components of the dish — cucurbits for their foundational role in many *moles*, cacao for its distinctive qualities and its salience to many *mole* afficionados, and avocado as a representative flavoring — may help understand some of the patterns of plant origins and domestication in this region. These plants all appear in Table 5.2, plants found in mole poblano, but only one of these appears in the Coe and Coe mole recipe.

6.1 Three cultural keystone species

Squash (*Cucurbita spp.*)

After chiles (discussed in the third chapter), the next most important component of *moles* is probably ground seeds or nuts. Bayless (et al. 1996) theorizes *moles* as "nut-thickened sauces," and Laudan's (2004) argument for the Mediterranean roots of *mole* rests heavily on the Islamic tradition of using ground nuts to thicken sauces. The predominant nuts or seeds often give their names to dishes in which they're used: *mole almendrado* (almonds) or *mole cacahuetado* (peanuts), or *guaxmole*, made from the seeds of *guaje* (*Leucaena spp.*[36]). Presilla (2012:769) notes that this is especially true of sesame seeds and almonds (which are used in Spanish and Moorish cooking), while there are also *moles* made with indigenous Mesoamerican species of walnuts, peanuts, pinenuts, pecans, walnuts, and, above all, pumpkin seeds, which are the base of *pipians* and many other *moles*.

Food writers often list squash as one of the three major American foodplants, in addition to corn and beans, which are celebrated as "the three sisters" following a Haudenosaunee

[36] In Hawai'i, where *guaje* was introduced as a source of fodder, this common adventitious tree is called *haole koa*, or more properly *koa haole*, but is not commonly thought of as a foodplant.

(Iroquois) tradition describing the plants as sisters who live together in a garden and take care of each other. This characterization has been widely disseminated, in part because it is understood to encode traditional ecological knowledge (TEK) about the mutually beneficial role of the plants: corn provides trellises for the climbing beans and squash, beans fix nitrogen, and broad squash leaves shade out competitive weeds (Doolittle 2000:144, Lewandowski 1987, Parker 1910, Rojas Rabiela 1988:88).

The primacy of this "holy triad" has probably been overgeneralized on a continental scale. In other parts of native North America different cultivated plants (such as wild rice) were at least as important, and even in eastern North America, agricultural traditions were various[37]. Mt. Pleasant and Burt (2010:57) note that Parker's (1910) oft-cited ethnographic observations probably describe general rather than universal practices, and that "historical records for including squash as one of the three sisters are even less certain," with documentation of squash being planted in separate fields at times. Corn and beans were introduced to eastern North America from Mesoamerica only about a thousand years ago, and came to overshadow some of the prior indigenous cultivars, though squash was likely one of these (Scarry 2008) as well.

In Mesoamerica the great number of other important cultivars make the southern extension of the "Three Sisters" paradigm an even more dubious overgeneralization, though one which North American writers continue to make (e.g. Gabaccia 2004, Landon 2008, Young 2007). Bauer (1990:9) argues that early twentieth century dietary dependence on these three plants in Mexico resulted from impoverishment during colonization, and Whitmore and Turner (2001:68) note that the intercropping of these three species may be more common today than in antiquity, following Rojas Rabiela (1988:88):

> If indeed these signs of agricultural practices referring to the association of [corn-bean-squash] cultivars are valid for traditional agriculture today, it remains impossible to generalize geographically or historically to the situation of the sixteenth century. The records in the chronicles are scarce and there has not yet been a systematic search. Ethnography constitutes an important resource for illustration, but its utility in this case is limited owing mainly to the changes in the assemblages of cultivars since the Conquest. These changes have to do with the decrease, substitution, displacement and disappearance from cultivation of plants or plant varieties that had then greater importance. These processes were a consequence of diverse economic, demographic and technical factors. Among the annual plants whose cultivation has nearly disappeared may be mentioned amaranth [*Amaranthus spp.*] and chia [*Salvia spp.*].[38]

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[37] However, the inclusion of eastern North America as one of the global centers of plant domestication, even though a broad area (on some maps it dwarfs Mesoamerica) with a few domesticates, while India, for example, is often omitted, is probably a case of the "botanist effect," in which the areas near universities have higher documented species richness, due at least in part to collection bias (Moerman and Estabrook 2006).

[38] "Si bien estos señalamientos sobre las prácticas agricolas referentes a la asociación de cultivos son válidos para la agricultura tradicional actual, no es posible generalizarlos geográficamente ni históricamente a la situación imperante en el siglo XVI. Lost registros en las crónicas son escasos y no

Coe (1994:38-39) argues that the foreign imposition of the holy triad framework is evidenced by the omission of chile, a "dietary cornerstone" which could never have been overlooked by Mesoamericans. Alternatively, Martinez (1992:218) suggests a "culinary triangle" of corn, beans and chile, but the impulse to name a "holy trinity" of ingredients is probably itself an artifact of later culture, and it is undisputed that cucurbits were important Mesoamerican cultivars in antiquity as well as today.

Often lumped together as one crop, the squashes are actually five species of *Cucurbita*: the South American domesticate *C. maxima,* and the Mesoamerican domesticates *C. argyrosperma* (*C. mixta*), *C. filicifolia, C. moschata,* and *C. pepo*, the latter of which was possibly domesticated independently in North America (Sauer 1993:47-48). *C. moschata* may have also been domesticated independently in South America, or it may have spread there in precolumbian times along with corn. Sorting out the species can be difficult for the layperson because the differences between cultivars within a species are as great as the differences between species (Heiser 1985:12).

While in North America, squash is used largely for its fruit, in Mexico the seeds continue to be important, and the flowers and tender shoots are eaten as well.

Cacao (*Theobroma cacao*)

Although it is not present in all *moles*, cacao, or chocolate, is the ingredient which has excited the most attention to the dish outside of Mexico and the ingredient for which *mole* is often best known. This is almost certainly due to the intense passion which many consumers feel for the confectionary forms of chocolate. Cacao is now a globally important crop, with the greatest production centering in West Africa, where the economics of its production have been of interest to humanitarian activists and political ecologists (Cappelle 2009, Ould et al. 2004, Ryan 2011).

In the form for which it is best known — that is, as a source of seeds for chocolate — the cacao tree was domesticated in southern Mesoamerica, but the location of and reason for its initial domestication are less certain, although the latter may be explained by its tasty fruit. The center of genetic diversity for *Theobroma* is in northern South America, and *T. cacao* may have originated as a hybrid in cultivation. How it traveled north to Mesoamerica is not known. There is no evidence that the seeds were used prior to its Mesoamerican domestication,

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se ha emprendido una búsqueda sistemática; la etnografía constituye un recurso importante de ilustración, pero su utilidad en este case es restringida debido principalmente a los cambios en los repertorios de cultivos ocurridos a partir del momento de la Conquista. Estos cambios tienen que ver con la disminuación, sustitución, desplazamiento y desaparición del cultivo de plantas o variedades de éstas que tenian entonces mayor importancia. Dichos fenómenos fueron consecuencia de diversos factores económicos, demográficos y técnicos. Entre las plantas anuales cuyo cultivo casi ha dejado realizarse, se pueden mencionar a la alegria o uauhtle y a la chía."

although Ogata (2003) argues that the conclusion that cacao was only cultivated in South America for fruit may have been useful for Spanish colonizers.

Henderson et al. (2007) suggest initial domestication may have been stimulated by making fermented beverages from the fruit, evidenced by drinking vessels which have residues of the alkaloid theobromine, found throughout the plant, but not caffeine, found only in the seeds. There is early evidence for cacao in the coastal plain of Soconusco, now in the southern part of the state of Chiapas, which was a region later prized for cacao (Coe and Coe 2007:180-182), and incorporated into the Aztec empire late in the fifteenth century (Gasco 1992). The region is also proposed as the origin of the Mesoamerican calendrical system by geographer Vincent Malmström (1997), since the zenith passages of the sun there (at 9° N. latitude) divide the year into the 260 and 105 day periods on which the calendars are based; it is not impossible that the stimulation of cacao beverages contributed to the innovation. The region still produces excellent chocolate, and in lesser quantities a related species, *T. bicolor*, known as jaguar cacao, also used for beverages.

The widespread Mesoamerican importance and use of cacao does not necessarily mean that it was used in cooking in antiquity. Arguing against a prehispanic origin of *mole*, Sophie and Michael Coe (2007:214) write that "the idea of using chocolate as a flavoring in cooked food would have been horrifying to the Aztecs. … In all of the pages of Sahagún that deal with Aztec cuisine and with chocolate, there is not a hint that it ever entered into an Aztec dish." This is a difficult thesis to support, however, because it relies entirely on an absence of evidence — in an area where evidence of all kinds is notoriously scarce.

Coe and Coe's (2007:43) observation that "if the Maya ever wrote down inventories, accounts, or even recipes, as often early civilizations did, they did it in a form — bark-paper books — which could not survive the sort of climate that cacao demands" is rather tame. The Mayans produced texts written primarily on paper made from the bark of *amate* (*Ficus glabrata* & spp.), which survived the elements better than it did the arrival of European conquistadors and clergy, who destroyed all of the manuscripts they could find in the sixteenth and seventeenth centuries (Staller 2009, Vail et al. 2003)[39]. At one *auto-de-fé*, in which at least twenty-seven manuscripts were burnt, the inquisitor and Bishop of Mérida, Diego de Landa, commented, "We found among them a great number of books written in these characters, and as they contained nothing in which there was not to be found superstition and devilish lies, we

[39] In some parts of colonial Mexico, the church showed little more tolerance for chocolate that it did for indigenous cosmology. An oft-repeated (if apocryphal) story recounts that in 1626 the bishop of Chiapas, Bernardino de Salazar y Frías, threatened to excommunicate parishoners who drank chocolate in church (to stay awake during his long sermons). He died shortly thereafter, possibly from a poisoned cup of chocolate, prompting the saying, "Le dieron su chocolate" (He'll get his [chocolate]). (González Gamio 2007, Forrest & Najjaj 2007:32).

burned them all, which they regretted to an amazing degree and caused them great affliction."[40] Only three or four known Mayan codices survived this policy; elsewhere only thirteen codices remain out of thousands that existed at the time of the conquest (Williams 1990:254).

While most manuscripts were destroyed, scholars in Mesoamerica have been able to work from inscriptions and imagery on murals and ceramics. A couple of Mayan vases show "tamales in what may be a *mole*-like sauce," according to Dreiss and Greenhill (2008:125-127)[41], who reject the "[claim] that the sixteenth-century Spanish were the creators of this ingenious culinary sauce." They also suggest that a vessel found at Copan, Honduras, containing fish bones along with cacao residue, could be "the remains of an early mole-like sauce." Noting that traces of cacao[42] have been found with turkey and other animal bones, McNeil (2010:298) argues that:

> Residue analysis in particular has proven that cacao, contrary to the tales of Europeans (Coe and Coe 1996 [2007]), was not simply a beverage prior to the arrival of the Spanish, but was also used in dishes with tamales and various types of animal flesh[43].

Besides residual traces, cacao beans themselves have been found in what appears to be a culinary context. At the Cerén site, in present-day El Salvador, Gerstle and Sheets (2002:78) found "one of the cacao-containing vessels had a layer of cotton gauze placed in it with chiles above, perhaps intended to be a Precolumbian *mole* sauce" (an interpretation reiterated by Sheets and Simmons 2002:182, same volume). Thus, recent archaeological evidence supports the idea that cacao was used in foods as well as beverages in precolumbian Mesoamerica.

Avocado (*Persea americana*)

Although not the most common of the herbs used in *mole*, avocado is worth looking at because it is one of the earliest Mesoamerican domesticates, and has a greater literature than most of the annual herbs. While avocados are best known outside Mexico for their amazingly rich fruits, it is not these which are used for cooking — the only *mole* in which they appear is the one named for the fruit itself, whose Nahuatl root, *aguaca-*, gives us the name for *guacamole*. In Mexico the fragrant leaves of the avocado tree are also used, and are sometimes included in the

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[40] "Hallamos les gran numero de libros de estas sus letras, y porque no tenian cosa en que no hubiese supersticion y falsedades del demonio, se los quemamos todos, lo cual sintierona maravilla y les dio mucha pena" (Lowy 1972:816, incuding translation).

[41] The most consistent cataloging of Mayan vases comes from the extensive "rollout" photographic documentation by Justin Kerr (1989-1992), showing the entire cylindrical image as a rectangle. Dreiss and Greenhill refer to Kerr Numbers 6418 and 1599. See <http://research.mayavase.com>.

[42] Residual analysis can show the presence of theobromine, a characteristic signature of the genus *Theobroma*, which could come from *T. bicolor* as well as *T. cacao* (McNeil 2010:297).

[43] McNeil (2010:304) notes that "there are a number of reasons why a cacao signature would be present in a tamale platter: cacao could have been used inside the tamales along with some sort of meat; or cacao could have been mixed into the masa (ground maize dough) of which the tamales were produced; or lastly, a sauce containing cacao might have been placed over the tamales."

category Mexican cooks call *hierbas de olor* ("fragrant herbs"), which is usually some combination of thyme, marjoram, oregano and bay. Both bay and avocado are members of the laurel family, which "characteristically has aromatic wood, bark, and foliage, which mankind has used in a variety of ways" (Sauer 1993:93).

The markets of Mexico display a great diversity of avocados, ranging from relatively small fruit (from about 4-5 cm in diameter) with large seeds and thin, dark skin to large fruit (to about 15 cm) with thick, light-green skin and flesh which is sweeter but less creamy. This spectrum reflects the apparently multiple domestication of the species, of which three prehispanic groups have been identified, known as Mexican, Guatemalan, and West Indian, although the latter appears to have originated either in Mexico or Colombia (Heiser 1979:315). The Mexican group was previously described as a distinct species (*P. drymifolia*) but is now considered part of the *P. americana* complex.

A distinguishing feature of the *drymifolia* group is its fragrant, anise-scented leaves[44]. Galindo Tovar et al. (2008a:519) note that this may have been a factor in the initial domestication of this variety:

> It is difficult to determine the first characteristics which were selected for; besides the fruit there is ethnobotanical data obtained from the municipios of Zongolica, Ixhuatlancillo, Aquila and Maltrata which indicate that the anise-scented leaves (characteristic of this type of avocado) have been used since antiquity as a flavoring in various foods[45].

The small avocados mentioned above belong to this type, and Katz (2013n12) describes the leaves used in *mole* as being from a tree "from the highlands, with small, purple-skinned fruit and more aromatic leaves"[46]. I have seen these fruits in markets in the state of Veracruz, and been told by vendors that they can be eaten with the skins, which turns out to be not unpleasant. The skins are about the same consistency as that of *Spondias* fruit and impart a flavor which is somewhat akin to the leaves. Another species of *Persea, P. schiedeana*, is also

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[44] The isotype is described as having *"folia trita odorem aromaticum spargunt…"* (von Schlechtendal 1831:365; Williams 1977:318).

[45] "Es difícil determinar cuales fueron las primeras características seleccionadas; pues además de las características del fruto hay datos etnobotánicos obtenidos en los municipios de Zongolica, Ixhuatlancillo, Aquila y Maltrata, que indican que las hojas de aguacate con olor a anís (característica de este tipo de aguacate) han sido utilizadas desde tiempos antiguos como condimento en diversos alimentos."

Interestingly, the authors do not mention this in their contemporary English-language publications on the origins of domesticated avocados (Galindo Tovar et al. 2007, 2008b), and it is interesting to speculate why. It may be due in part to an expectation that Anglophone readers know avocado only through its globally famous fruit, and in part because of the environment of earlier scholarship around it, which built on work done by economic botanists, whose interest was potential crop improvement. In the context of a bias against delicacy, so to speak, the horticultural association of scented leaves with thin-skinned fruits (Popenoe 1935) may have selected against fragrance as an object of scholarly interest.

[46] "Il s'agit d'une variété d'avocatier des hautes terres, qui donne des petits avocats avec une fine peau violette, et dont les feuilles sont plus aromatiques."

found in Veracruz markets; and has larger fruit (and larger pits), whose flesh is sweeter and less creamy than that of *P. americana*.

It is interesting to note that the comparison with anise has also been made not only with the leaves of *Sassafras*[47], another tree in the Laurel family, but with a number of unrelated Mexican plants which appear in *mole* recipes, including *hierbasanta*, *Piper auritum* (PIPERACEAE) and *anís montés* (mountain-, i.e. wild-, anise) and other species of *Tagetes* (ASTERACEAE).

6.2 Aspects of Mesoamerican plant domestication

Although three species are too few to give us a representative sample of the Mesoamerican domesticates, they provide illustrative examples for some of the dynamics of early agriculture in this region.

For one thing, all of these plants have been somewhat taxonomically ambiguous, that is, multiple species have been used for similar purposes, and assignment of species names has varied through time. The cucurbit species seem to be scientifically stable, but it is far from obvious which species is the source of particular ingredients found in markets, and probably unimportant to most consumers. Avocado varieties formerly assigned separate species are now grouped as one, but the differences between them are highly salient to consumers, particularly those who use them for their fragrant leaves. Cacao likewise has three important subspecies or cultivars, and a related undomesticated species used in similar ways, which as a "wild crop relative" may also help contribute to the species genetic diversity. Some of the other Mesoamerican species share these characteristics, including corn (*Zea mays*), whose close wild relative teosinte (*Zea spp.*) is sometimes seeded in the same *milpa* cornfields, and chiles, which at one end of their morphological spectrum shade into the wild (or feral) *chiltepines*.

Notably, all three of these plants also have multiple uses, and may have been originally selected for reasons not obvious to the foreign consumer (seeds for squash, fruit for cacao, leaves for avocado), although these uses are still important in their area of domestication (if somewhat less so for cacao). Similarly, *teosinte*/corn may originally have been selected for its sweet stalks (Smalley and Blake 2003). This is a good reminder that the relationship between plants and people changes over time, especially as plants move from one group of people to another.

Finally, cacao is an exemplary case of transdomestication, that is, a plant which was domesticated at some distance from its ecological origin. Like cacao, both chiles and tomatoes have natural centers of diversity in South America, but centers of domestication in Mesoamerica. The dynamics of this are still not well understood, but point to a long history of

[47] Either leaves or roots may be used to make *filé* powder, an important spice in Cajun cooking. In Mexico, *Sassafras* is used as a beverage plant.

intercontinental movement of cultivated plants, which also may have carried the sweet potato north, and corn south. When in the sixteenth century CE sailors from Europe and Asia[48] reached Mesoamerica, they joined in an ancient history of long distance exchange of plants and peoples.

Transdomestication underlines a key feature of Mesoamerican agriculture, which is that the plants come from a remarkably heterogenous set of environments. Linares and Bye (2012) illustrate the useful species that originate in six different forest zones. Five of the six types include species used in *mole*. Although the coastal mangrove is not a source of domesticated plants, it is a habitat for gar (*Atractosteus tropicus*) and other species used as seafood in a variety of ways, including with *mole*. Not only was exchange between continents, and between ecosystems, important for the development of agriculture on an evolutionary scale, but the rugged topography of interlinking ecosystems within Mesoamerica made it possible to assemble a foodplant palette of striking complexity, which made it possible to create a complex dish with flavors that represented the spectrum of Mesoamerican diversity.

[48] As Spain colonized Mesoamerica, it opened a steady trade between its outposts in Manila and Acapulco, known in Mexico as the Nao de China trade (Pacheco Olvera 2006).

Table 6.1. Forest zones per Linares and Bye 2012; species used in or with *mole* are in bold.

Zone	Species	Spanish name	English name
temperate pine-oak forest	*Prunus serotina*	capulín	wild cherry
	Crataegus pubescens	tejocote	hawthorn
	Pinus spp.	**piñones**	pine
	Carya** and **Juglans spp.	**nogales**	pecan/walnut
	Quercus spp.	encinos	oak
	Arbutus spp.	madroños	madrone
	Amanita caesaria	**yemitas**	
	Lyophyllum decastes	clavitos	
	Boletus edulis	mazayeles	
	Morchella spp.	mazorquitas o pancitas	
	Hevella spp.	gachupines	
rainforest	***Sechium edule***	**chayote**	chayote
	Vanilla planifolia	**vainilla**	vanilla
	Piper auritum	**hoja santa**	
	Pimenta dioica	**pimienta gorda**	allspice
	Oecopetalum mexicanum	cachichín	
	Begonia manicata	tecosxocoyoli	
	Cyclanthera langaei	cinco quelite	
	Ipomoea dumosa	xonequi	
	Peperomia peltilimba	tequelite	
cloud forest	*Ceiba spp.*	pochote	kapok tree
	Pouteria sapota	mamey	
	Chrysophyllum spp.	caimito	star apple
	Persea spp.	**aguacate**	avocado
	Manilkara achras	chicozapote	sapodilla
	Pouteria campechiana	zapote amarillo o borracho	yellow sapote
tropical deciduous forests	***Leucaena spp.***	**guaje**	koa haole
	Pithecellobium dulce	guamuchile	
	Diospyros digna	zapote negro	black sapote
	Casimiroa edulis	zapote blanco	white sapote
	Byrsonima spp	nanche	
	Annona cherimola	chirimoya	custard apple
	Annona muricata	guanábana	soursop
	Psidium guajava	guayaba	guava
	Spondias spp.	ciruela	hogplum
	Porophyllum macrocephalum	**pápaloquelite**	
xeric scrub	*Stenocereus stellatus*	pitaya	
	Opuntia spp.	tuna	
	Mammillaria spp.	biznaga	
	Ferocactus pilosus	cabuches	
	Agave spp.	maguey	
	Yucca spp.	izote palm	
	Prosopis spp.	mesquite	
	Lippia spp.	**oregano**	
coastal wetlands	*Atractosteus tropicus*	pejelagarto	

6.3 Essentializing biogeography

In the mestizo narrative of *mole*, the biogeography of the species which are used to make the dish is explicitly accounted for — but only at a hemispheric scale, with old-world plants treated as a stand-in for Spanish or European culture, and New World plants treated as a stand-in for indigenous culture, which foreshortens the long history of interactions that took place before the exchange of the sixteenth century. To make this particular encounter meaningful, plants are assigned a fixed cultural and spatial identity, which obscures the diversity of their origins and the cultural engagements that brought them to the encounter.

However, the identification of plants with their evolutionary centers of origin, even after centuries long traditions of use, is not universal in discourses of national cuisines. Few argue that Irish culture is hybrid because of its adoption of the potato, or that Szechuan cuisine is less Chinese because of its celebrated use of chiles. The Italian appropriation of tomatoes (and noodles for that matter) rarely leads anyone to suggest that the resulting dishes are anything other than wholly Italian.

A recent Italian use of food as political proxy brought up a similar question. Northern Italy's conservative Lega Nord, mentioned above, pursued a nativist agenda seeking "to protect local specialties from the growing popularity of ethnic cuisine," including that of Southern Italy (Grasso 2010, McKinley 2010). This included a campaign against cous-cous and a valorization of polenta, which prompted a rather strong reaction on the listserv of the Association for the Study of Food and Society (ASFS), a major forum for academic food scholars:

> That's about the stupidest thing I've heard so far from the heartstoppingly stupid Lega Nord (Northern League) which is so stupid it makes Sarah Palin look like an out-and-out intellectual. Polenta is the interloper here. For those in northern Italy who don't know, polenta is a creation of Native American Indians[49] while couscous, aka cuscussu in Sicily, aka fregola in Sardegna, is a full-blown native product made with hard durum wheat which has been grown in Italy, pace Clifford Wright, since ancient times.[50]

This analysis illustrates the importance of scale in assigning biogeographical values. The listserv writer addresses distributions at a macroregional or continental scale, and employs a kind of biogeographical essentialism as a category of analysis, while the *Lega Nord* is more concerned

[49] It is worth noting that while corn is a native American domesticate, its preparation as *polenta* is a European innovation, and one that reduces its nutritional value, historically leading to outbreaks of pellagra in Italy (Andrews 1993, Nabhan 1993).

[50] <http://lists.nyu.edu/read/messages?id=2881277> As statements in the forum are not intended for publication, the author is not cited here.

with regionalism rather than a pan-national identity, and incorporates the subsequent cultural biogeography of the plants into its category of practice.

The means of plant transfers are also critical here. That northern Italy in past times of maritime exploration appropriated foodplants of other continents might be thought by patriots to only add to its greater glory. In contrast, foods introduced by migrant workers may mark disempowerment, even (or perhaps especially) if the foods themselves originate much closer to home. The cultural biogeography of plants includes their histories of interactions, and these may be colored by people's perceptions of how power works in those interactions.

6.4 Biogeography and cultural agency

An unfortunate consequence of looking at the synthesis of Mexican culture on a binary hemispheric scale is that it obscures the amazing, particular cultural histories of the plants — particularly the "new" plants of Mesoamerica — and consequently the agency of the many New World cultures that interacted with them through time. When such a binary involves colonizing and indigenous cultures, it is probably impossible to avoid the echoes of other binary values, especially that of active and passive engagement.

This is reflected in literature which questions whether indigenous cultures can retain their identity if they incorporate new material — a question that should seem absurd in light of all the plants that Mesoamerica incorporated from South America, if those exchanges weren't obscured by generalization.

The legitimacy of incorporating new ingredients is a key point in the discourse on *mole*. In her well-known work on *Being Indian in Hueyapán*, Friedlander (1975:96-98,132-133) concluded that a Hueyapán *mole* was non-indigenous, based on its inclusion of ingredients originating in Asia. Robichaux (2005:107) has criticized this evaluation as an essentializing, "museographic" concept of culture which denied the continuing inventive agency of indigenous people.

Increasingly this view is being challenged by indigenous and other writers, who recognize native agency. Cibeles Henestrosa Ríos de Webster makes her position clear in the first paragraph of the *Receterio zapoteco del Istmo*, a passage too rich not to quote in full (2000:11)[51]:

[51] "Tres son las cocinas: la china, la francesa y la mexicana. Este juicio, opinión, generalmente aceptada, ha sido contradicha, sin embargo, al postular que la cocina mexicana ocupa el primer lugar y la francesa el tercero. Sea como fuere, la nuestra es una de las grandes cocinas, y dentro de ella, la más rica, en la doble acepción de la palabra, la de Oaxaca en el país con el mayor número de etnias, razas, idiomas, cultura, en fin: una cocina para cada uno, un saber, un sabor que las singulariza. La dichosa conjuncíon de las especias, la recaudería indígena y la blanca, explica la variedad de los platillos regionales. La mano india, el genio indio, la imaginación india supieron armonizar olores, colores, sabores, hasta cierto día inéditos, inauditos. ¿Qué otro pueblo de México tiene siete moles de distinto sabor, color, olor, ya de por sí nutricios, sabrosos? Con lo que saber, sabor, sabroso, vienen a ser palabras hermanas. Así todos los pueblos oaxaqueños."

> There are three cuisines: the Chinese, the French and the Mexican. This generally accepted judgment has been contradicted, however, by the postulate that Mexican cuisine occupies the first place and French the third. Be that as it may, ours is one of the great cuisines, and within it, the richest — in both senses of the word — is that of Oaxaca, the region with the greatest number of ethnicities, races, languages, culture — in sum: a cuisine for everyone, a knowledge, a taste [*un saber, un sabor*] that distinguishes them. The happy conjunction of the spices, the produce — indigenous and white — explains the variety of regional dishes. The Indian hand, the Indian genius, the Indian imagination well understood how to harmonize aromas, colors, flavors, previously unknown and unheard of [*inéditos, inauditos*]. What other people of Mexico has seven *moles* of distinct flavor, color, aroma, and in themselves nutritious and delicious? For which savvy, savor, savory, come to be sister words. Such are all the Oaxacan peoples.

While the cuisine is enriched by both indigenous and introduced ingredients, Henestrosa locates the agency for integrating them in the indigenous culture, stressing that it is embodied in the labor and practice of making food, i.e. "the Indian hand," as well as the intellectual conception of it.

Yet the Spanish colonizers' destruction of the majority of the written knowledge repository of the New World has made it harder to see the past and imagine what it must have been in order to transfer all of those plants. Nabhan recognizes the multiplicity of cultures in the cosmopolitan encounter:

> With my eyes half shut from the warm light of sundown and the prolonged effects of the pulque, I tasted one last spoonful of mole. It began to whisper a litany of places and spices: allspice from Jamaica, aniseeds from Syria, chiles from Puebla and Oaxaca, chocolate from the lowlands of Mexico and from Brazil, cloves from the Moluccas, cinnamon from Sri Lanka, coriander from Egypt and Sudan, onions from China, peanuts from the Brazilian Amazon, and sesame seeds from India.

but still sees the Columbian exchange as "the extension [of globalization] to two new continents" (271), i.e. not seeing the Americas as already globalized through sophisticated transdomestication.

Cultural biogeography reminds us of the long histories of interactions between plants and people, and between different cultures, that unfolded in the Americas over millennia, and continued with the encounter with Europeans. In particular, transdomestication undermines the binary view, making it unrealistic to posit indigeneity without agency, or biogeography without culture. Cultural biogeography returns us to a sense of the continuous past.

VII. Conclusions

7.1 The importance of being ambiguous

The use of *mole* as a proxy for the mestizo national character depends upon two ways of defining *mole*. Mapping its biogeography onto the mixed origins of the Cosmic Race requires understanding *mole* in a strict sense to refer essentially to a particular version of the dish, notably the elaborate *mole poblano* of the convents. Those who argue that there was no prehispanic *mole* are referring to this, which they might argue is the "real" *mole* celebrated as a national dish. In contrast, claiming that *mole* is found throughout the Republic means understanding it in the broadest sense, inclusive of a wide spectrum of dishes throughout the national territory which include both the great variety of foods called *mole* in the central part of the country, and dishes otherwise named in other regions — many of which do not contain a mestizo blend of ingredients.

These two claims are clearly at odds, which would present a problem — if *mole* had to be clearly defined. But it does not, because as a common-sense category of practice, it is taken for granted as a thing in the world. The ambiguity of *mole*, which can be both specific and general at the same time, is what allows the nationalist discourse to work. In doing so, it mirrors the ambiguity of the term *Mexico*, which is also at once specific and general, a clearly delimited territory as well as a broad transnational category of identity.

So, although *mole* cannot be read simply as a semiotic map of Mexican national character, without essentializing and reifying both the food and the nation, it remains an excellent proxy for the nation, because the same processes that are used to construct one category of practice are used to construct the other. Iconic foods give us insight into the construction of place not because they are essential elements of it, but rather because they are not.

7.2 One or several moles

As powerful as the explanation of *mole* as exemplar of mestizo national identity is, it is not the only reading of *mole* — nor of national identity. The dominant discourse is strongly associated with the postrevolutionary civil society dominated by the Institutionalized Party of the Revolution (PRI). While PRI hegemony was challenged at various times, the Party remained firmly in power through the 1990s and the quincentennial of Columbus' voyage, celebrated as the birth of *mestizaje*. But only a few years later, the last PRI presidency was disrupted by the largely indigenous Zapatista (EZLN) rebellion in the southern state of Chiapas, which inspired new articulations of nation more pluralistic than that of a single national character.

At around this time, some food writers began challenging the idea that *mole* was a mestizo dish. Cristina Barros and Marco Buenrostro (Barros 2004, Buenrostro and Barros 2003) draw attention to the prehispanic origins of the term itself (*molli* is a Nahuatl word that includes a range of dishes), and the continuing diversity of dishes popularly understood to be *moles* in contemporary Mexico, many of which have no old-world ingredients.

Just as the meaning of Mexico is naturalized in discourse, but constructed in different ways at different times, so too is *mole*, which can be understood as a category of practice whose boundaries are negotiable. *Mole* is treated as "*a* dish," in the singular while at the same time it is recognized as a class of foods, the boundaries of which are often contested, and used in quite different ways by different people. Even while many people agree that *mole* is a national dish, they use different definitions — or more commonly no definition — of what *mole* is. The reinvention of *mole* is the reinvention of Mexico. Because the symbolic character of spatially iconic dishes is culturally constructed, and changes over time, the study of these dishes offers geographers a way to study the shift and persistence of cultural values, and the means by which they are inscribed in place.

7.3 Culinary agency and artistry

In Mesoamerica, indigenous ingredients originate across a range of ecotypes, and the assembly of a complex *mole* depended on extensive trade networks even in precolumbian and colonial periods. While a great diversity of species may be consumed within *mole*, they fall within several structural classes, allowing substitution where necessary (i.e. as paradigmatic rather than syntactic ingredients of a culinary grammar). Some recipes note the meats which might be substituted, so that a *mole* could be made, for instance, with either young turkey (*cócono*) or frog's legs (Toledo Vargas et al. 2006:32). In other cases, ambiguous folk taxa might allow the use of a variety of possible ingredients, so that, for instance, a plant with a cilantro flavor might be obtained from a range of locations, replacing a low elevation cultivar of *Coriandrum* or *Eryngium* with a cold-zone (Katz 1996c:359) gathering of *Peperomia*.

Yet this flexibility of cooks frustrates analysis, and determined place-making, because the origins or the ingredients cannot always be pinned down and assigned meaning. There is a structural impulse for the analyst to make common cause with the nationalist, in essentializing both the dish and the place. So it is not surprising that, in much of the food literature, writers conflate categories of practice and analysis. It produces very appealing narratives. The danger is not simply that the whole messy spectrum of diverse practices might be obscured, but that doing so disempowers the very people who created the fantastic dish in the first place.

While working on celebratory foods is undeniably fun, it also turns out to be important. Food permits the kind of investigation into multi-scalar geographic identity that Agnew (2002) investigated through politics — though it is generally a much less volatile topic, and one on which many people are happy to talk at length. The festive table makes this especially clear, as a site of celebration. Satisfied guests at the feast praise both the art of the cooks, and the qualities of the ingredients, and often make much of their provenance. In Mexico, *mole* is a context that invites celebration as much as it marks it. The table is a contact zone for more than fellow diners; it is also where foodplants display their arts, their qualities and capabilities — i.e. their ability to sustain, to flavor and to satisfy[52]. These are actions as much as attributes, and open a way for us to see the plants' agency as well, in reaffirming the coevolutionary relationships which will encourage humans to maintain the landscapes which support them. The table is where people and plants *make place for each other* on a daily basis.

[52] Although Pratt (1997) writes in terms of human cultures, with power relationships between them, her definition of contact zone reads equally well applied to species. See also Hinchcliff 2007.

Appendix A: Interviews

I am grateful to all of the following experts who spent time educating me about mole. The interviews were not used for my thesis *per se*, because they were conducted before I began my graduate program, and without review by an IRB, but they form the background understanding from which the thesis was written.

Table A.1 *Mole* experts consulted in Mexico, Fall 2007.

Scholars & Scholar/chefs	Place	Date	Tape
Edelmira Linares	Feria del Mole & Moles Don Pancho, San Pedro Actópan, DF; Ozumba, Edomex; Jardín Botánico, UNAM, DF; Mercado Merced, DF	5-Oct-2007 9-Oct-2007 12-Nov-2007 6-Dec-2007	07mx16, 07mx17, 07mx18; 07mx50, 07mx51; 07mx80, 07mx81
Ricardo Muñoz Zurita (with Edelmira Linares)	Café Azul y Oro, UNAM, DF	7-Dec-2007	07mx47, 07mx48, 07mx49, 07mx50
Cristina Barros & Marco Buenrostro	San Jeronimo, DF	1-Nov-2007	07mx44, 07mx45
Diana Kennedy (with Laurie Durand)	Quinta Diana, Zitacuaro, Mich.	24-Nov-2007	07mx68, 07mx69, 07mx70
José Luis Curiel	Casa Merlos, DF	13-Oct-2007	
Janet Long	UNAM, DF	31-Oct-2007	07mx43
Ricardo Pérez Montfort	CIESAS, Tlalpan, DF	29-Nov-2007	07mx73
Rachel Laudan	Bosques de Tetlameya, DF	2-Dec-2007	07mx76, 07mx77, 07mx78
Reyna Pacheco	Tlalpan, DF	29-Nov-2007	07mx74
Nisao Ogata & Araceli Aguilar Meléndez	Xalapa. Ver.	22-Oct-2007	07mx35, 07mx36, 07mx37, 07mx39
Beatriz Ramírez Woolrich	Coyoacán, DF	3-Dec-2007	07mx79, 07mx80
Chefs	**Place**	**Date**	**Tape**
Ana María Morgado Morales (with Laurie Durand)	Fonda Ana, Xalapa. Ver.	23-Oct-2007 23-Oct-2007	07mx38, 07mx39, 07mx40
Doña Lore (María Loreto) Flores de Tufiño (with Edelmira Linares)	Atlautla, Edomex	29-Sep-2007	
Ofelia Toledo	YuNeNisa, Oaxaca, Oax.	19-Nov-2007	07mx63, 07mx64
Chef Alejandro Ruiz & souschef Felipe Samario	Casa Oaxaca, Oaxaca, Oax.	20-Nov-2007	07mx65, 07mx66, 07mx67
Martha Patricia Morales Fuentes & Luis Alberto Pozas Guzman	Fonda el Viejito, Xico, Ver.	20-Oct-2007	
Toñita Veliz Gonzalez	Xico, Ver.	20-Oct-2007	
Teresa Mendez Herrera	Comedor Teresita in Mercado de Abastos, Oaxaca, Oax.	14-Nov-2007	07mx52
Rosalba Ramos	Mercado Organic el Pochote, Oaxaca, Oax.	17-Nov-2007	07mx54
Lupita's daughter	Fonda Lupita in Mercado 20 de Noviembre, Oaxaca, Oax.	19-Nov-2007	07mx62, 07mx63
María Luisa Obregón & Virgilio Saldaña, of Moles Santa Celia	San Jeronimo, DF	10-Oct-2007	
Dolores Olivares Báez	Expo Flor, Xalapa, Ver.	17-Oct-2007	
María Teresa Ortiz Escalante & Ana Casteñeda	Expo Flor, Xalapa, Ver.	22-Oct-2007	07mx34
Sra Ariana Lozada Vega	Molino de chiles Ozumba, Edomex	29-Sep-2007	
Molineros	**Place**	**Date**	**Tape**
Ignacio "Nacho" Islas	Molino de chiles Ozumba, Edomex	29-Sep-2007	
Bonifacio de la Caña & Alfredo Durán Salazar	Molino de San José, Xalapa, Ver.	24-Oct-2007	07mx40, 07mx41
Arnulfo Gil	molino in San Pedro Atócpan, DF	5-Oct-2007	07mx16

Appendix B: Quantitative analysis of mole distribution and composition

I assembled data to address the questions of 1) whether the number of *moles* in the central part of the country differs from the national average, or from the number found in the provinces; and 2) whether there are differences in the numbers of ingredients found in different categories of *mole*. This appendix describes the datasets used and gives details of the statistical analyses applied.

Mole_by_State lists the 32 states of the Mexican republic, and the number of Spanish-language websites reported by Google searches of each state name with "mole." Problems with this sampling strategy are discussed below. This set builds on a database file associated with a georeferenced shapefile, allowing the data to be manipulated by GIS software.

Mole_Recipes lists 360 recipes drawn from published sources, listing the source and page number of each recipe, the region and culture to which it belongs, and the number of ingredients which it contains. Where determinable, recipes have been classed into types at two hierarchical levels.

Mole by state

I assembled data to test whether *mole* is evenly distributed across the 32 states of the Mexican republic by recording the number of results from Google searches on Spanish language websites, for the term *mole* and each state name, excluding sites that included five state names in order to avoid counting sites with a national focus. Results were to a database associated with a shapefile of Mexican states from the US National Atlas. This produced a dataset of 32 records in four fields.

Table B.1. State *mole* association dataset field names and types.

Column	Contents	Data Type
1	State Name	Nominal
2	State Abbreviation	Nominal
3	Number of Associations with *Mole*	Continuous (Ratio)
4	Centrality of State	Nominal

Table B.2. Descriptive statistics for number *mole* association for all Mexican states, and states divided into central and peripheral groups.

	all states	central	peripheral
Count	32	12	20
Mean	59,906	86,492	43,955
Std. Dev.	33,672	38,119	17,159
Std. Error	5952	11004	3837
Variance	1,133,828,992	1,453,095,379	294,441,552
Coef. Var.	0.562	0.441	0.390
Minimum	22,500	35,500	22,500
10th percentile	27,370	40,260	25,850
25th percentile	34,650	62,200	29,400
Median	52,850	82,000	39,450
75th percentile	75,100	110,000	60,500
90th percentile	108,400	142,500	69,850
Maximum	167,000	167,000	76,200
Range	144,500	131,500	53,700
IQR	40,450	47,800	31,100
Skewness	1.365	0.660	0.573
g_1, $\alpha(2) = .05$	0.824	1.264	1.018

Descriptive statistics for this data set are shown in table B.2. Notably, the skewness (1.365) exceeds the critical value of symmetry expected for n=32 (.824), prompting the further analysis described in Chapter 3.

I tested hypotheses for significant difference between both central states and all states and central and peripheral states:

1) $H_0(1)$: $\mu_C - \mu_N = 0$; there is no difference in the number of *moles* associated with central states from the national average.

   $H_A(1)$: $\mu_C \neq \mu_N$; there is a significant difference in the number of *moles* associated with central states from the national average.

2) $H_0(2)$: $\mu_C - \mu_P = 0$; there is no difference in the number of *moles* associated with central states and the number of *moles* associated with peripheral states.

   $H_A(2)$: $\mu_C \neq \mu_P$; there is a significant difference in the number of *moles* associated with central states and the number of *moles* associated with peripheral states.

A visual assessment of non-parametric hypotheses, expressed in terms of median numbers of associations rather than means, can be seen in comparative box plots (Figure 3.3), and indicate a strong rejection of the null hypothesis in the case of the difference between central and peripheral states, and a weaker rejection in the case of the difference between central states and states in general, suggesting that this hypothesis should also be investigated by other means. Tests shown below are summarized in Chapter 3.

Table B.3. One-sample test comparing median associations of *moles* in central states with overall median value.

One-Sample Sign Test for *Moles* Central	
Hypothesized Value: 52850	
# Obs. > Hyp. Value	10
# Obs. < Hyp. Value	2
# Obs. = Hyp. Value	0
P-Value	0.0386

Table B.4. Two-sample Mann-Whitney test ranking associations of *moles* in central states with those in peripheral states.

Mann-Whitney U for *MOLES*	
Grouping Variable: CENTRALITY	
U	33
U Prime	207
Z-Value	-3.386
P-Value	0.0007
Tied Z-Value	-3.386
Tied P-Value	0.0007
# Ties	0

Table B.5. Unpaired means comparison of associations of *moles*, in central states and peripheral states.

Unpaired Means Comparison for *MOLES* Grouping Variable: CENTRALITY Hypothesized Difference = 0						
	Mean Diff.	DF	t-Value	P-Value	95% Lower	95% Upper
central, peripheral	42,537	30	4.344	0.0001	22,537	62,537

Variance Comparison for *MOLES* Grouping Variable: CENTRALITY Hypothesized Ratio = 1							
	Var. Ratio	Num. DF	Den. DF	F-Value	P-Value	95% Lower	95% Upper
central, peripheral	4.935	11	19	4.935	0.0060	1.785	16.004

Mole recipes

This dataset describes 360 published recipes, comprising 360 records in twelve fields.

Table B.6. Ingredients dataset field names and types.

Column	Contents	Data Type
1	Recipe_number	Continuous (Ordinal)
2	Source	Nominal
3	Page_number	Nominal
4	Spanish_name	Nominal
5	English_name	Nominal
6	Region	Nominal
7	Culture	Nominal
8	Ingredients	Continuous (Ratio)
9	Type	Nominal
10	Red_or_not	Nominal
11	Centrality	Nominal
12	CIP_or_not	Nominal

Recipe_number gives each recipe a unique record number, while **Source** and **Page_number** give the literature reference. **Region** and **Culture** describe the geographic and ethnic origin of the recipe where given. **Ingredients** gives the number of ingredients in each recipe. **Type** sorts the recipes into 11 classes of *mole* based on their names, which together comprise more than half (192) of the records; other recipes fall outside these classes, or are too specialized or ambiguous. A number of these types (*colorado/coloradito, de guajolote, negro, poblano, rojo*) fall under the general category of red *mole*, which is generally what is meant by *mole* in English; the **Red_or_not** field groups these *moles* as "red" and distinguishes them from "other." **Centrality** sorts recipes into "central" or "peripheral" based on **Region** and using the geographical limits determined in the **Mole_by_State** dataset. **CIP_or_not** sorts recipes into "CIP" or "other" based on whether they were published in the 54-volume series *Cocina Indígena y Popular*, discussed below.

Since only one of these fields gives data in a ratio form, analysis will be limited to comparing the distribution of data in this field within different nominal categories.

Table B.7. Descriptive statistics for number of ingredients of *mole* distributed by type

	Total	***amarillo***	***colorado/ coloradito***	***de guajolote***	***de olla***	***molito***	***negro***	***pipián***	***poblano***	***rojo***	***tesmole***	***verde***
Count	282	22	7	7	14	12	9	34	9	14	17	28
# Missing	78	2	1	1	0	3	2	1	2	1	0	6
Mean	10.6	8.0	16.3	10.4	11.1	7.8	19.8	7.7	19.1	15.1	6.3	10.1
Std. Dev.	5.4	2.9	6.0	2.4	3.3	2.3	5.8	2.7	4.0	4.4	1.2	3.7
Std. Error	0.323	0.615	2.286	0.896	0.882	0.649	1.928	0.458	1.328	1.185	0.294	0.703
Variance	29.506	8.331	36.571	5.619	10.901	5.061	33.444	7.123	15.861	19.67	1.471	13.847
Coef. Var.	0.512	0.359	0.371	0.227	0.296	0.287	0.292	0.346	0.208	0.293	0.193	0.369
Minimum	2	4	10	7	7	6	9	3	10	10	4	4
Median	9	7	13	12	12	7.5	20	7.5	20	15.5	6	10
Maximum	31	14	27	13	17	14	26	14	23	24	8	19
Range	29	10	17	6	10	8	17	11	13	14	4	15
IQR	6	5	7.5	3.75	5	2.5	9	3	3.75	6	1	4.5
Skewness g1	1.136	0.829	0.864	-0.391	0.429	1.767	-0.57	0.418	-1.333	0.429	-0.368	0.43
	0.286	0.976	>1.416	>1.416	1.186	1.264	1.416	0.801	1.416	1.186	1.093	0.876

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